13th ARGO DATA MANAGEMENT MEETING

Hyderabad
14th November - 16th November 2012

Version 1.0
4th December 2012

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1 Objectives of the meeting

The 13th ADMT meeting was hosted by INCOIS, Hyderabad, India and was held at the Daspalla Hotel in Hyderabad. It started at 9am on the 14th November and finished at 13h30 on the 16th November. 40 persons from 13 countries and 22 institutes participated in the meeting.

The objectives that had been fixed for the meeting were the following:

- Review the actions decided at the 12th ADMT meeting to improve Real-Time data flow (considering all aspects of the system from transmission from the float to arrival at GDAC and accessibility of data by users)
- Feedback from monitoring the quality of Argo float data processing in Real time and Delayed mode
- Review Regional Argo Data Centre progress
- Report from the 1st Bio-Argo Workshop

Dr SSC Shenoi, Director of INCOIS was very pleased to welcome the participants for the 10th year of Indian Argo program that started in November 2002. It's the second time INCOIS has hosted an Argo meeting, welcoming AST in 2005 and now ADMT in 2012. Since the start of the program 275 floats have been deployed by India in the Indian ocean. He pointed out the Indian Ocean was traditionally data sparse and Argo has changed that radically. Such data are critical for data assimilation into the models. Recently INCOIS received funding for another 5 year plan that would allow purchase of another 200 (or more) floats over next 5 years. India plan to trial BIO-Argo floats that will be soon deployed in the Bay of Bengal, the Arabian Sea and the equatorial Indian Ocean region. The Indian government is convinced that the Argo program needs to be supported, for multiple applications: process studies, climate research, climate change to better understand the role of oceans in all of this.

2 Feedback from 13th AST meeting

Having achieved global coverage for 5 years and operating for over 10 years the AST spent some time looking both backward, on how we got to where we are, and forwards on the evolution of Argo. S Wijffels provided an overview of the past 10 years and pointed out that it was agreed that without an innovative, comprehensive, flexible data system, neither the implementation nor the broad impact of Argo would have been possible. This month, Argo has delivered its 1 millionth profile to users and has underpinned at least 1000 high quality scientific papers. The high quality of the Argo data set has also been a key ingredient in its success.

Looking forward the steering team is considering how Argo can evolve to take on new tasks and support new users, but in a way that strengthens and not weakens its initial goals. During these discussions, the concept of "missions" for Argo was adopted, where we can think of our current goals as being the "global mission". An obvious first extension of Argo is to spatially complete the "global mission" by extending the 3x3° 10 day sampling into the marginal seas and sea-ice covered zones. This was not attempted at Argo's conception due to grounding and ice-damage, but is only possible now due to high-bandwidth satellite communications. Resources for this expansion on a global scale, though, are not yet secured.

The AST reconfirmed that its ongoing first priority is to implement and sustain the global Argo mission, which means

- Achieving completeness and sustaining its high quality – DMQC, pressure biases, meta data
- Need for deployment opportunities in remote regions (Kaharoa, Lady Amber)
- Improvement of trajectory data
- Managing the impact on the data set of the transition to high bandwidth satellite communications

The second priority is to actively manage the evolution of Argo – that is, the addition of new missions. These may include

- Expansion of the global mission to marginal seas, ice zones (pilots being analysed, resourcing not secured)
- Enhanced boundary current sampling (pilot in the Kuroshio should be examined)
- Deep Argo (first platforms being deployed, regional pilots in 2-3 years, global design needs development)
- Bio-Argo (sensor and political issues need resolving, regional pilots may start soon, global design needs development)
- Near surface mission (pilots being analysed, need to evolve the data system to allow distribution and seek QC resources if needed)

The AST has concerns that the need to accommodate pilot deployments of floats configured for new missions are impacting the Argo data system through

- Increasing complexity
- Taking up time and forming a distraction from completing the global mission

The path forward is to ensure that new engagements are win-win. In some programs these pilot deployments are already providing resources to grow the data teams and are increasing our user base. In most programs, though, this has not occurred so far. The AST will need a forward view of this growing complexity to ensure the data system can cope both in format issues but also in resourcing. Feedback to the AST from the ADMT is essential on how the DACs are coping with the sometimes competing demands of the global mission and distributing pilot data from new missions. A roundtable was held in Venice at the excellent 4th Argo Science Workshop. A short working paper on the evolution of Argo has been produced which will be used to solicit community input and be discussed at AST-14, March 2012, New Zealand. ADMT input will be vital as well.

1. Status of Argo Program and link with Users

1.1. Review of the Actions from last ADMT

Sylvie Pouliquen reviewed the status of the action items from ADMT-12. At ADMT12 it was decided to identify the high priority actions from routine and low priority ones. It has also been agreed to organize phone meetings (one in January, one in June) to better monitor the progress and identify earlier when issues block progress. The January meeting focused on the high priority issues and the ones due for AST, while June focused on the rest of the actions. This way of functioning has proven to be efficient and all DACs agreed to work the same way next year. The status of the actions are:

- High: 7 were done, 9 partially, 3 postponed and 2 postponed waiting for DM File Checker
- Routine: 18 were done, 19 partially, 4 not done

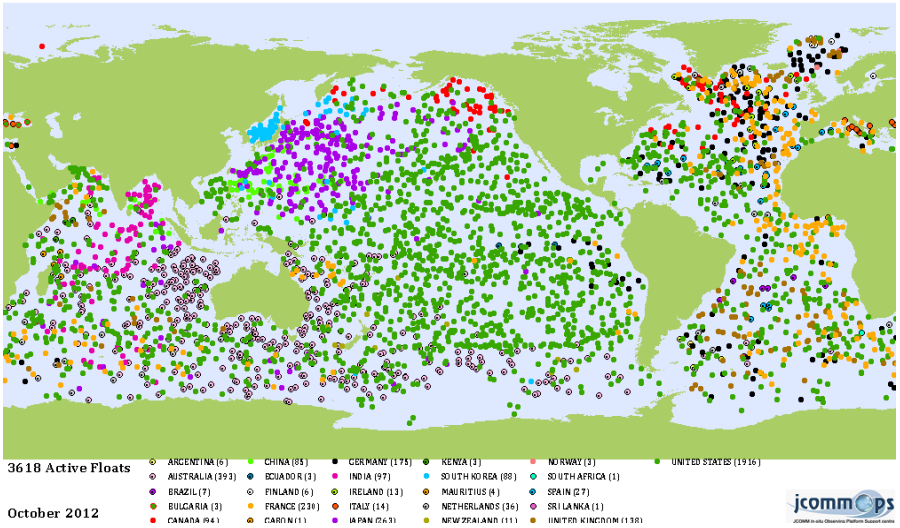
The actions regarding trajectory and metadata were delayed as some of the specifications needed to be completed and were discussed at ADMT13.

See complete status in Annex 3.

1.1. Argo Status and AIC development

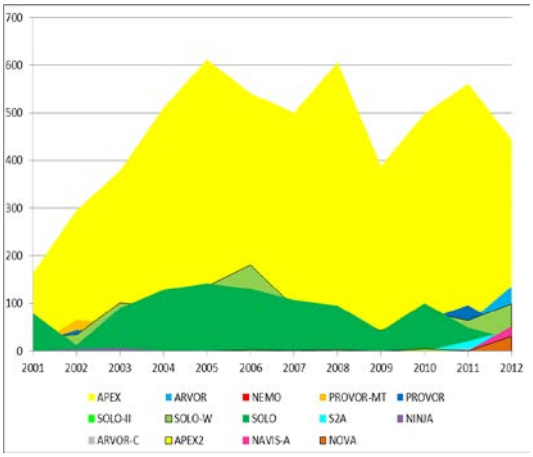
The Argo Technical Coordinator, M. Belbeoch, reported on the status of the Argo array and highlighted some issues for the ADMT. Argo has been sustaining a 3000 floats network for the last 4 years and is starting to improve it. The array has risen to 3618 active floats, the largest it has ever been.

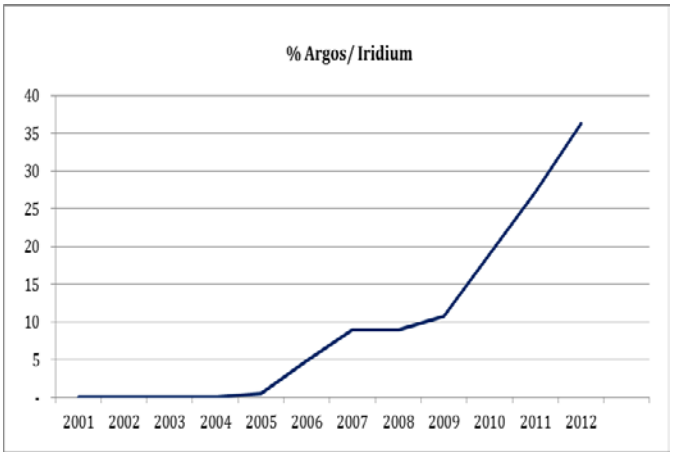
TC recalled the status of national contributions and the new commitments for 2013 from Brazil and Iran in particular.



Following up AST 13, TC mentioned that the target number for a "Global Argo" was still to be refined and appropriate indexes clarified for its monitoring, as well as for ancillary Argo arrays (regional, deep, etc). However, if we consider a global coverage, only 75% of the array operates according to initial mission definition (below 1750 dbar, with data, no greylist, etc), which includes the spatial distribution. The yearly challenge in managing deployments is impressive and he pointed out some areas that are difficult to maintain (South Ocean, North West Indian Ocean, large parts of the Pacific Ocean) or places where new gaps are forming. The use of dedicated deployment opportunities (and funding) will be required to address those gaps. TC announced then that the JCOMMOPS ship coordinator was being finalized (for a start in Feb. 2013) and this person will support Argo by recruiting ships for deployments. This new coordinator will be the Technical Coordinator for the JCOMM Ship Observation Team, including VOS, SOOP and GOSHIP programs. ADMT can expect a good monitoring over CTD made with GOSHIP.

TC presented data demonstrating the good diversity (or competition) of float models and manufacturers which are all improving float reliability that has doubled over the past decade. He reminded us that iridium communications were being used more often vs Argos telecommunication systems and reminded us that diversity was a guarantee of sustainability for Argo.





He then described the status of the Argo data stream. The difference of profiles distributed over GDACs/GTS is around 20% every year and an effort on processing first profiles in time might permit us to improve this by 10%. TC then gave homage to the Indian Argo program with one of its floats in the Bay of Bengal identified as sending the 1 000 000th profile (#2901287).

He commented on the status of delayed mode processing (80 % of eligible profiles have been processed) saying that about 5% were not undergoing DMQC ("orphan floats"). The remaining 15% were in the hands of existing DM operators.

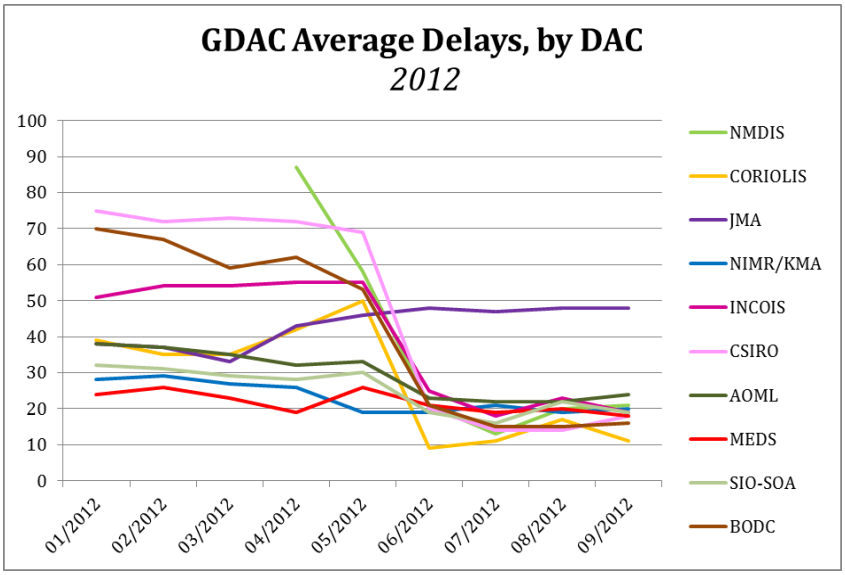
He mentioned 4 problems to be solved (and referred to his status report for details):

1. Floats pending at AIC (registered but no tracking data available anywhere) : 74, a bit high due to the time it takes to prepare new iridium decoders
2. Floats not yet registered at the AIC (21, reasonable)
3. Float registered at AIC, but not available on GTS (186, too high)
4. Float registered at AIC, but not available at GDACS (51, usual)

Action : Look at AIC report and solve the issue about coherency between AIC/ GTS /GDAC

He presented then his report on delays at GDACs (only comparison to the French GDAC was possible), and various plots. Improving delays will permit us to share more data in realtime (within 24 hours). The Delays observed at GDACs have improved substantially in the second half of 2012 through a combined effort at DACs and GDAC level. But there is some room for progress for a few DACs.

There are too many late submissions of profiles. If the median value (29h) is reasonable, only 36% of observations are distributed to users within 24h. To improve such delays, DACS are invited to share the STANDARD_FORMAT_ID before deployment, as well as data samples for code testing. In addition, descriptions of DAC practices have shown that a number of processing steps are launched at different times, with rough offsets, which introduce small delays. They should rather be chained. It would be good to set up an RT raw data delivery from Argos (see Coriolis recent practice) coupled to a RT processing chain (rather than a daily data download e.g.). All DACs, and French GDAC should provide feedback on the document to help identify problem origins and AIC will finalize this report by AST meeting



The issue for JMA DAC was identified following up on the report. For some reasons, files were rejected by the French GDAC so they were distributed after the synchronization with US GDACs (adding then 24h). Maybe this happened sometimes to other DACS. GDACS should monitor files coming from the synchronization in index files and study why it happens. The significant drop in delivery times which occurred mid 2012 is still to be understood, but it was probably a change at French GDAC. Argo Data flow could be improved from deployment to final formatting by removing discontinuous steps and human interventions. Deployment planning information management (between PIs, AIC, DACs) should flow machine to machine, and the AIC will develop appropriate tools and procedures to facilitate it.

Action : DACs have to look at their process to check unnecessary delays and chaining processing as much as possible.

TC then concluded his presentation and suggested the ADMT should think today about the long time evolution of its data system, to expand its user community. He mentioned finally that there were a number of new data display/discovery/monitoring tools that are under development or recently developed and that it would be good to present and discuss these during a dedicated workshop (outside ADMT), from a technical perspective, targeting interoperability, outreach, etc. The developers of those tools would be willing to share their practices.

2.1 Citation Index for Argo

Argo has been seeking a convenient way of tracking the usage of Argo data in the scientific literature for a couple of years. The desire is for a single identifier that can be searched for in publications.

There are numerous digital object identifiers available but Digital Object Identifiers (DOI) are the identifier that is widely understood, commonly used in the scientific literature and has been developing the fastest. Choosing a different identifier would create significant extra work and may lead to an identifier that would become redundant. Thus effort in the last year has gone towards investigating whether the DOI can be made to work for Argo.

The reason assigning a single DOI to the 'mutating' Argo dataset is not currently an option is the expectation by the data publishing community that a DOI should link to a static/unchanging set of data. This has benefits including ensuring published research is reproducible. The Argo data set on the GDACs is not static since it is growing every day and existing data are frequently updated when data are screened or quality controlled in delayed mode.

However, recently the German Research Centre for Geosciences and the UK Office for National Statistics have extended the utility of a DOI from an Argo perspective by introducing the 'open time series' concept for their data products:

- Each data product type is an open time series that is continuously appended to until the end of the mission.
- Each product is formed of dozens to millions of discrete files.
- Each of these data product types is assigned a DOI.

The key point for Argo is by assigning a DOI to a data product it becomes part of the record of science and should not be changed but it may be appended to without issuing a new DOI.

It happens sometimes that data products are reprocessed, e.g. when a new version of the processing algorithm was developed. In this case a new DOI is assigned to all reprocessed objects. This is done to be able to distinguish different versions of the data. This approach is a step towards the needs of Argo. However, this would lead to the need to generate thousands of DOIs for assignment to Argo data and archival of the entire dataset thousands of times a year. These reasons make it impractical and do not meet the initial requirement of Argo. It is a step closer to our need though.

An alternative using the open time series concept would be to assign a DOI to each time series, which leads a user always to the latest version, and assign DOIs to each version of the time series (current and older versions). In addition, data can be labeled as "reference quality" or not, i.e. only label stable and quality controlled version of data are "reference quality". So how to assign a DOI to ARGO data?

- Assign a DOI to each time series.
- Assign a new DOI when a time series is reprocessed and keep the old data with the old DOI (versioning).

This approach has similar issues to the previous approach so Justin Buck does not recommend it is pursued at this stage. This is not the end of the story though as there are 3 other research infrastructures in Europe with similar needs to the Argo community. Also, the open time series concept is currently under discussion with views on the concept polarized (for and against). It is hoped progress will be made on this in the coming months.

In the meantime there is a way the Argo community may benefit from using DOIs in their current form. The power to format minted DOIs lies with individual minting authorities. This has the significant advantage that DOIs can be crafted to make them easily findable by including the project name in the DOI e.g.

doi:10.5285/argo9c42-4dfb-4da9-be97-c532ce13922
(where 5285 is the minting authority and the project cab be included in the DOI)

In this example the string 5285/argo is readily searched for in the scientific literature so partially meeting our needs.

This approach could apply to any DOIs assigned to Argo data such as manuals or quarterly zipped versions of dataset. Using zipped versions (archived at NODC with a DOI assigned) of data for research would create a need for user education and may aid the reproducible research need. It does not help when Argo data are merged with other data or real time data users though. Assigning DOIs to Argo documentation is simple and will be pursued by Thierry Carval. It was also suggested that versions of climatology data and delayed mode software could also carry DOIs. Originally version numbers were used for this and the use of a recognized identifier would be a benefit in terms of a more precise audit trail of our quality control. Assigning master DOIs to each climatology dataset with subordinate DOIs on the data contained also offers the potential benefit of accrediting data providers.

A significant point that emerged from discussion was a need for clarification of what the Argo community wants from DOIs. They have not yet met our original need but numerous other uses have emerged. If the discussion on the open time series concept reaches a conclusion before the next AST meeting it may be worthwhile presenting the current situation with DOI to identify which options to pursue.

3 Real Time Data Management

3.1 GTS status

ISDM routinely collected oceanographic data distributed on the global telecommunication system (GTS). From Jan 2012 to October 2012, we received 99360 in TESAC format and 74614 messages in BUFR format from Argo floats from various GTS nodes. 83% and 47% of the Argo TESAC and BUFR were transmitted within 24 hours of the float surfacing, respectively. Currently, we received Argo data transmitted under 10 bulletin headers. Below is a summary of data volume and timeliness of Argo TESAC and BUFR from various GTS bulletin

GTS Bulletin	Country	# of TESAC Message	% of TESAC reported within 24 hour	# of BUFR message	% of BUFR reported within 24 hour
AMMC[1]	Australia	11545	89.1	1525	38.2
CWOW	Canada	2826	70	2582	58.4
DEMS	India	1858	64	0	-
EGRR[1]	Exeter	4011	89.7	71	55
KWBC+KARS	USA	50177	82	6198	36
LFPW+LFVW[2]	France	17076	86.6	3603	96
RJTD	Japan	10013	82	9539	91
RKSL	Korea	1854	73.9	0	-

Note:
[1]We requested the GTS BUFR Bulletin at the end of Aug 2012. Hence the volume of BUFR is for only the month of September and October
[2] The BUFR volume is solely from LFVW.

For all of the TESAC we received, there are 6 TESAC with depth greater than 2500 dbars. There are 18 floats transmitting TESAC with suspicious instrument code of 00101 and 86560.

The volume of BUFR messages is about 20000 less than that of TESAC volume. This could be due to the fact that some of the data centers such as Korea and India didn't start to send BUFR yet and some of the bulletin headers are missing on the GTS. The timeliness of BUFR data is also lower than that of TESAC. This could be due to the fact that BUFR messages were generated from NetCDF files which are closer to the end of data processing system.

Anh will run her check every quarter and send the report to the DACs so they can check the timeliness and resolve any issues more quickly. DACs should also send the list of BUFR headers they use to Anh so she can make sure that she is checking the correct data streams.

Readiness to transition from TESAC to BUFR was discussed and it appears we still need to do some work on timeliness and completeness before we can turn off TESAC distribution to the GTS. This will also be critical for multi-profile data distribution. Some problems could be at the Met offices, not the DACs so we need to work with them to solve the problems. There also might be differences between Argos and iridium data streams. Anh will try to separate these two data types and see if there are particular issues with either source.

3.2 Status of anomalies at GDAC

Since last ADMT, monthly reports are provided to each DAC to summarize all the anomalies that are detected during the month. The report is sent to argo-dm@jcommops.org. The messages are available on the ftp site ftp://ftp.ifremer.fr/ifremer/argo/etc/ObjectiveAnalysisWarning/ and reports (pdf format) on ftp://ftp.ifremer.fr/ifremer/argo/etc/Report_ObjectiveAnalysisWarning/. A checking of the generic or operator address has been asked for a few DACs; the content of the message and steps to generate the message have been also explained.

Statistics on anomalies show a total of less than 150 profiles failed by month for all DACs. For some DACs, the amount decreased from summer. Most of the DACs have done correction of profiles and if necessary sent feedback to Coriolis. Few of them need to be again contacted to identify problems with reception of the messages and/or to understand corrections. During this year, some DACs have taken care of the messages sent after the objective analysis, some improvements have been done and the number of anomalies seems to decrease for some of the DACs.

For recurrent profiles with very bad measurements, a list of those floats will be sent to the DACs to put them in the grey list. Few profiles have also have bad data that were not detected by the automatic tests, especially when difference between values is smaller than the threshold of the gradient test and spike test, for levels shallower than 500 dbar. Without visual control and /or climatology test, those profiles will keep getting into the Argo flow.

Others problems have been detected. Concerning the fields of adjusted parameters, when the data_mode is A, for some DACs only pressure adjusted is filled. This is the case for BODC, INCOIS, KMA, MEDS. All are in progress of correcting this or it has been done. INCOIS still has "old" RT files where the data_mode is R instead of A. In NetCDF files, dimension of variables are different from the specifications in the user manual. For instance, string 4 is used when the definition of the parameter indicates string 16. This difference can be a problem in some models reading the NetCDF files.

It was noted that CSIO files do not report any adjusted fields in their R files, despite these floats requiring pressure correction based on their model and the Surface Pressure Offset name used in the technical files. This will need to be investigated and we will have to ask them to fix this problem.

It was also clear that some problems seen are the result of the file checkers not checking content for consistency and conformation with the rules. It is very important that the DACs provide feedback and fix anomalies in their files.

3.3 Status of anomalies detected with Altimetry

The Altimetry check has been performed every four months again this year and automatic emails have been sent through the AIC database to the DM-operator and DAC responsible for the extracted floats. 25 floats are currently on the list. Old anomalies were discussed: mixed of R and D files, no or bad propagation of D-mode correction in R files, Navy floats with no DM-operator.

The general quality of the Argo dataset has showed better quality than one year ago, particularly for real-time observations: 33.4 % of difference for 103 606 RT profiles in 2012 (DATA=MODE='R') versus 56.7 % of difference for 99 672 profiles in 2011.

A specific study has also been carried on to compare SLA/DHA differences to SLA/DHA adjusted differences. This allowed the identification of 6 new floats that show inconsistent D-mode correction in R files with the one present in D files, and identification of 3 suspected floats that are under investigation. This new test will be implemented in the quarterly analysis to complement the actual tests

3.4 Status of density test implementation

The density inversion test was redefined last year to increase accuracy. The reference level was set to the mid-point between the two levels being tested and the critical value for failure of this test was set to 0.03. It was also decided to ignore regional differences, differences between float models and between sampling methods.

Generally the test is being well applied with very few outliers in the density test audit. There were more than 75 R profiles in the last 3 months which had density inversions larger than allowed but the data was not flagged bad. In D mode, only 10 profiles had unrealistic density inversions though more than 40 profiles had inversions between 0.5 and 1.0 which should be re-checked. Ann will send all files of excessive density inversions to the DACs so they can check their processing for this test.

Note that it is necessary to re-run the density inversion test after D-mode has been done because inversion can disappear from the data during this process.

All DACs should download the test profile from:

http://www.argodatamgt.org/Documentation/Validation-and-reference-data

and run their software using this data to confirm that we are all applying the test in a consistent way.

3.5 Proposal for Near Surface measurement RTQC

In summer 2012, Fiona Carse of the UK MetOffice conducted a study comparing Argo-derived near surface temperatures with OSTIA (Operational Sea Surface Temperature and Sea Ice Analysis) satellite data. OSTIA is an ocean satellite product that gives a foundation temperature of the near surface ocean. OSTIA corrects for the effects of diurnal warming and therefore does not resolve vertical temperature variation near the surface. This study found that temperature gradients within the surface 10 dbar could vary by up to 1.5 °C from the OSTIA derived foundation temperature, particularly at depths shallower than 4 dbar where Argo-derived temperatures were typically warmer. Such variation may cause data to trigger the temperature drift RTQC test. However, the temperature gradients observed did not violate the 9 °C threshold used in the gradient test.

Clare and Justin propose that pressure-conditions be written in to the current RTQC testing system so that NST data (i.e. surface to 4 dbar) are treated differently to the main profile, but remain part of the main profile where appropriate (i.e. this is not the case for un-pumped NST data and STS data).

ADMT needs to educate users that the secondary profiles are 'different' – with different accuracy and reliability. Pumped and un-pumped surface data is fundamentally different and will be reported in different profiles. Though GHRSST would like to have raw scans near the surface from Argo floats, there will be a cost to this both in communications and data management. The AST will need to consider how useful this surface data is and whether it is worth the extra effort for the DACs.

All profiles can be viewed as three component phases near the surface:

1. The first phase are data >= than 4 dBar depth. This includes any overlap between the NST data and the primary profile. This should be subjected to the standard real time QC tests.
2. The second phase spans 0.5 to 4 dBar and is the near surface phase. This profile section may include legitimate salinity and temperature drift, and density inversions. Therefore, these tests should be dropped for the NST phase. Our proposed modifications and validity of tests in this phase are described in Table 1.
3. The third and final phase is the profile termination phase. This may include very near surface measurements and atmospheric measurements. Therefore, application of standard real time QC tests is not appropriate. Depending on the intended purpose of the data it may still be useful to the user and so we suggest this 'surface data' should be flagged PARAM_QC='0' with no further QC applied.

Table 1: Table describing modifications needed to real time quality control tests for near surface Argo data.

Test	Modification	Comment
Gradient	None	shows 9 °C threshold is unlikely to be triggered so no change needed to test
Density inversion	drop test	Drop this test for near surface data (<5 dBar depth).
Grey list	None	No changes but, new parameters need to be communicated to operational centres so they understand the measurements.
Gross salinity or temperature sensor drift	drop test	Drop this test for un-pumped SST values, 1 °C threshold will be triggered in this data frequently because the un-pumped data is shallow and 1 °C is within the one standard deviation bar

3.6 Argos System status and services for the Argo program

After the successful launch of METOP-B with an Argos-3 instrument on board, the Argos constellation is now composed of 7 operational satellites: five NOAA POES and two EUMETSAT spacecrafts. The Argos service on METOP-B will be opened to all Argos users in January 2013. Next launch of a satellite with an Argos instrument on board is SARAL (ISRO) with an Argos-3 instrument early 2013. Since the 20th of October 2012, the Argos system ground network has a new data center in Toulouse, highly secured and fully operational 24/7.

In answer to ADMT12 action item 25 & 56, CLS and JCOMMOPS are submitting a cooperative project to improve the historical Argo trajectory dataset and the way to access Argos locations diagnostic data including error ellipses for all DACs. The CLS - JCOMMOPS proposal is composed by 3 work packages with a total of 63.5 working days. The complete proposal will be submitted to the Argo Steering team and the Argo Trajectory team for decision.

The advantages to the new processing include 8% more locations, better accuracy, the elimination of unrealistic positions, plus error estimation (ellipse) for all location classes. We had planned to start with reprocessing all data from the beginning of 2008 but after discussion, only reprocessing from 2010 would be necessary as the trajectory data will be processed from ANDRO until end 2009.

3.7 Feedback on profile reduction for TESAC

Details on how to sub-sample long profiles for GTS-TESAC transmissions were presented. Questions raised in the Argo DAC cookbook were addressed. The cookbook will be updated accordingly. It was agreed that a different scheme needs to be developed for cases where deep Argo floats exceed the length limit for profile. Claudia will propose a sub-sampling scheme for these floats based on the way they profile.

3.8 Finalize recommendation for bad data flagging for Provor floats that present the 2047db anomaly

PROVOR and ARVOR pressure is coded on 11 bits in the Argos message. Therefore, any pressure values greater than 2047 db are truncated to 2047. Moreover, either the absolute pressure or a value relative to the previous level is transmitted in a given message (that contains data from 5 to 7 interleaved levels). Pressures that are calculated relative to 2047dB are therefore also wrong.

DACs have to identify the good and bad pressure values during decoding Argos messages.

Cécile suggests that the following algorithm should be applied when decoding Argos messages:

- The first absolute pressure found equal or greater than 2047 dB is flagged as bad (flag 4)
- The following relative pressures are flagged as bad, their value is set to 2047.
- The first absolute pressure found lower than 2047 is good and the following relative pressures are also good.

The Algorithm should be applied to ascending profiles and descending profiles.

The affected float versions are all ARVOR, PROVOR and PROVOR-DO with Argos or Argos3 transmission. ARVOR Iridium is not affected by the 2047dB issue. This is not a big problem with only 60 profiles from 21 floats affected at this point but we must handle them correctly. For the newest ARVOR (software version ≥ 5605A06) and PROVOR, PROVOR-DO (software version ≥ 5816A04), the problem with the pressure values relative to 2047dB is solved but it is still possible to find 2047dB pressure values. These will not require any special decoding, however.

4 Pressure correction

The last full audit reported in early September on the state of the GDAC at end of July 2012. Susan Wijffels on behalf of Jeff Dunn introduced new plots to summarize performance of all DACs. Several DACs have responded to discuss the report and to help us improve further.

The rate of pressure correction "agreement" appears slightly worse for 2012 as at end of July, than for 2011. [see purple bar at bottom of following chart]. This is as yet unexplained but the cause will be identified if the trend continues. A major improvement is that KORDI's RT processing now includes pressure correction.

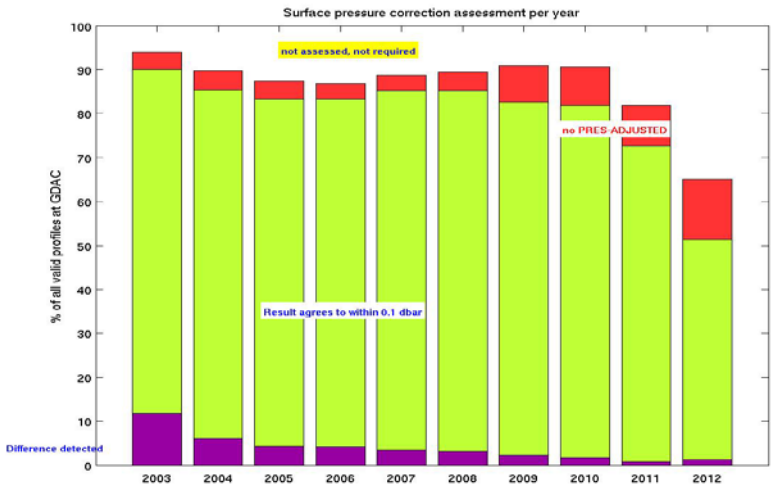


Figure 1: The audit found that for most years 80% of DACs compliant (green). However, some R files do not have PRES_ADJUSTED when needed (red). The % of floats not compliant is larger in the early years (purple)

ACTION: DACS check the audit site to ensure that files that are non-compliant in D mode are edited where required to be compliant.

4.1 Requirement to populate ADJUSTED fields in real-time processing.

Floats which do not auto-correct pressure for surface offset must use a surface pressure parameter name which indicates that RT surface pressure correction is required. For all such floats, ADJUSTED fields should be populated in RT processing. There are thousands of profiles where this has not happened in the past, and it is still not the practice everywhere (Coriolis [NEMO floats], CSIO [Apex], and BODC were noted in the September audit). This is unrelated to the SP=0 issue discussed later.

4.2 Real Time ADJUSTED fields not populated if SP=0

Some groups have used data-mode A only where a non-zero correction is required for pressure, so ADJUSTED fields have been populated only where surface pressure (SP) is not 0.

The majority of DACs treat this case as they do any other valid SP value, and believe that populating ADJUSTED fields should not be determined by whether SP is non-zero. This seems to be the consensus view now. This method has been adopted at ADMT13 for all new applicable R files, but there should be no requirement to regenerate previously created R files.

The QC manual has been edited to make this clear:

"Zero is a valid SP value. Therefore when SP = 0, PRES_ADJUSTED should be filled. In this case, PRES_ADJUSTED = PRES."

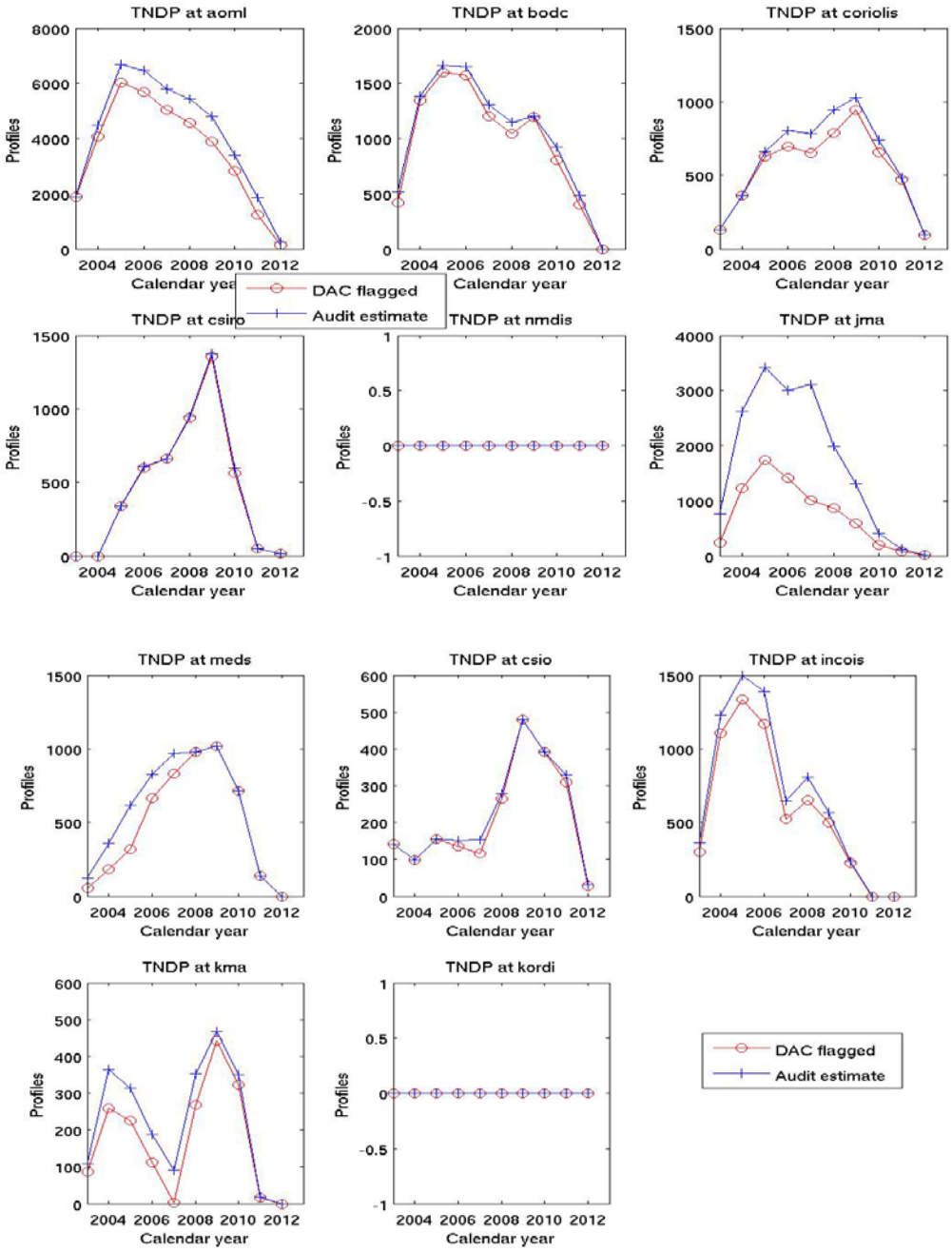
ACTION - where SP=0 in a non-autocorrecting float, DACs should populate the adjusted fields for R files generated from now on, and for D files as they are processed. The status at each DAC was reviewed:

- Doing : JMA, CSIRO, MEDS, BODC, INCOIS, KORDI
- To be checked : CSIO, NMDIS, KMA, Coriolis
- No done yet : AOML

Some DACs will need time to reprogram to conform with this decision. The next surface pressure audit will review whether DACs are filling these fields according to the agreed procedures.

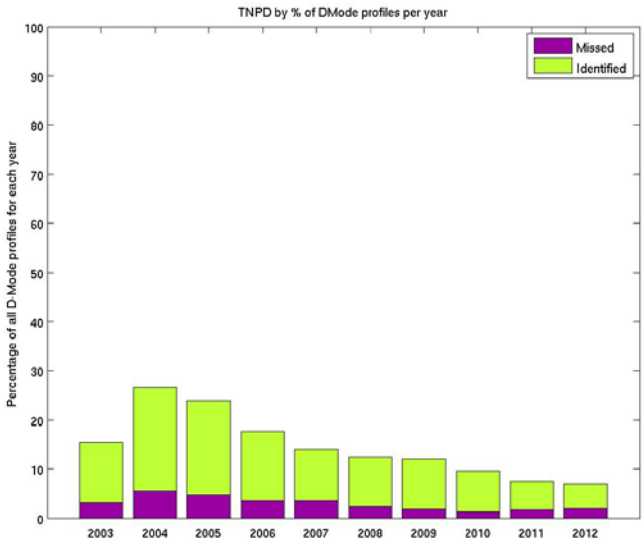
4.3 Treatment of Truncated Negative Pressure Drifts (TNDP)

The annual counts of TNPD exaggerate the decline of the problem because TNPD is only assessed for D-files, and these are much fewer in later years. Nonetheless the floats that are deployed in recent years won't be affected as the problem has been solved on APEX floats. Correct treatment of TNPD is high in present DM processing. A large number of previously DM processed files have not correctly treated TNPD – see the gap between blue and red lines in the following figures. Nearly every DAC has some files in conflict with the audit. If this is an audit error we are keen to fix this.



ACTION DM Operators need to check the audit for non-compliance in old D files and patch in the TNDP identifiers where needed. This does not entail a full D-mode reprocessing, just a selection of the start profile (check in audit) and for affected profiles, the addition of comments, change of QC flags and error fields for PRES_ADJUSTED.

Overall, TNDP-affected profiles are slowly disappearing as that generation of floats exhausts their batteries. However, in the early years of Argo, they do impact a significant part of the profiles (>10%). The Argo DM Operators have done very well in dealing with this complex and unforeseen problem. It is now just a matter of treating the small remaining few profiles correctly.



5 Feedback on BIO-Argo Workshop

Hervé Claustre provided a report of the Bio-Argo workshop. Four variables were identified as core BIO-Argo variables that need to be handled as first priority by the data management teams (Oxygen, Chlorophyll-a, Backscatter, Nitrate). Four emerging variables were identified but will need more testing before entering into the system (PH, Radiometry, Transmittometer CP and CDOM)

The development of BIO-Argo is beginning in regional climate change hotspots chosen by the biogeochemical community, which will maximize scientific returns from limited resources. The sensors are expensive, man power for deployment is more important as reference CTD measurements should be systematically done, and the data management system needs to be set up. So Bio-Argo is not yet a true 'Argo' program in the globally scattered sense. Once proven, the costs should come down, and it will be possible to expand coverage. The hotspots identified are the Arabian sea, North Atlantic, Med Sea, Austral Ocean and Kuroshio extension. Each location requires specific sensors tailored to the specific scientific question. Most of the Bio-Argo floats will be Argo compliant – 10 (or 5) day cycles with parking at 1000db and every 3 to 6 profiles to 2000 dbar.

Bio-Argo has a cost (float cost, communications costs, reduced lifetime because of additional sensors, people to manage program at DAC level). It should be developed in a way it enhances Argo and not be a parasite on Argo by providing additional funding (satellite agency for validation NASA, ESA, CNES) + additional man power for data management and scientific QC.

Nonetheless, Susan Wijffels pointed out that the present legal arrangement with IOC/WMO is not valid for Bio-Argo (it only covers T&S) and scientist should apply for clearance through UNCLOS when deploying Bio-Argo floats that may enter an EEZ.

A list of 15 actions was made and a representative at ADMT was identified for some actions on data format and RTQC procedures. A complete report will be issued in the coming weeks and will be made available from the Argo Data Management WWW site.

6 Reference database

Two versions have been provided since ADMT12, one in March 2012 (2012_V01) and a second one (2012_V02) in November 2012. The first version has integrated US-NODC updates (October 2011 and January 2012) and CTD provided by Esmee Van Wijk for the Southern part of the ocean (Southern surveyor). The second version takes into account dataset from ICES, updates from US-NODC (August 2012) and CTD provided by CCHDO (2 datasets sent in November 2011 and October 2012). Updates from US-NODC and datasets from CCHDO improve distribution of the CTD in the Atlantic and Pacific oceans as well as Southern Ocean (Pacific area).

The last version (2012_V02) has been provided in smaller tar balls, one by WMO box area (1-3-5-7): for instance, CTD_for_DMQC_2012V02_1.tar.gz for all boxes starting with WMO 1, then 4 tar files are available for the version 2012_V02.

CCHDO's Steve Diggs presented information related to the acquisition and inclusion of ship-based hydrographic data in the delayed-mode QC database (DMQC-DB). The update included a brief outline of the data system and how much data were added to the system since ADMT-12. NODC added 20,721 high resolution CTD casts, and the CCHDO contributed an additional 1,712 non-public high-resolution CTD casts that were provided to the Argo program for exclusive use in the DMQC-DB.

Since ADMT-12, both the BODC and Scripps delayed mode analysts have provided feedback to the CCHDO regarding areas of the ocean where it is difficult to apply the O/W corrections due to insufficient amounts of reference data. The CCHDO has had success using this information to convince PIs to release these data for Argo QC use years before these data become public. Notable additions included the 2011 and 2012 Great Belt cruises from Barney Balch, the Agulhas/ACT CTD profiles provided by Lisa Beal as well as the Canadian/HUDSON cruises in the northern Labrador Sea. More participation of this sort by all of the Argo regional QC centers would significantly improve the utility of the DMQC-DB.

JCOMMOPS already provides US-NODC, Coriolis and the CCHDO with the coordinates of CTD profiles at float deployment locations which has proven very useful.

The GLODAP2 Project (R. Key/Princeton) expects to make significant contributions to the reference data effort by contributing 50-100 early release cruises in the coming months. The only condition is that Argo (CCHDO, Coriolis, US-NODC) provide a detailed inventory of the hydrocasts which are already in the DMQC-DB to ensure that the data providers are only approached once for their proprietary files. In addition, Argo should provide information about the data update procedures to the existing profiles in the database since these data are known to change as a result of post-cruise adjustments by the cruise PIs.

There is a possibility that both WHOI's BCO-DMO and the CCHDO will work together to provide reference data for the bio-Argo floats. Finally, the CCHDO expects a fair number of ship-based CTD profiles in 2013 -2014 to add to and improve the DMQC-DB.

7 GDAC STATUS

7.1 Feedback on progress for the actions related to GDAC

Thierry Carval presented the actions related to GDAC

Action 10: provide ZIP files of the DAC and GEO directory updated on weekly basis

Once a week, at French GDAC, each DAC directory and each GEO directory is zipped in a directory of the GDAC. This service, which allows users to download significant quantities of data, will be documented in the Argo user's manual that will be issued after ADM13 (Hyderabad version).

This functionality still needs to be installed at the US GDAC.

Action 11: Implement detailed index at US GDAC

This functionality is not yet implemented. It should be implemented together with the DM Format checker. The AIC technical coordinator pointed out that this information is really needed before AST14 as AIC need to present information on delays from both GDACS.

Action 12: Create NMDIS DAC at US GDAC

The Chinese NMDIS DAC is now available on US GDAC.

Action 13: GDAC to consider accepting compressed files from DACs

This new service is operational on the French GDAC. A DAC can now push a compressed file containing a series of files to the GDAC and the GDAC will process all its content. The compressed file is a tar-ed file or directory compressed with gzip. The file naming convention is XXX.tar.gz (Example: coriolis-201210-DelayedMode.tar.gz)

- XXX : the compressed file name, with no specific requirement
- tar : tar suffix
- gz : gzip suffix

Action 14: Provide DM-Checker Documentation and provide to DACs access to Checker results

The DM format checker developed by US-GDAC team ran in test mode from January to August 2012 with some DACs who provided feedback to Mark. No information was provided by Mark on when the DM-Format checker will be turned to Operations.

Actions 15, 16, 17 : implement the new version of file checker

The actions related to the upgrade of the file checker are stalled.

7.2 What's new on GDAC

Thierry presented what are the new features available at Coriolis GADC and its operational status.

He stressed a critical issue: the USGODAE and French GDACs are no longer distributing the same Argo dataset. DACs mentioned that file removal was not working well at GDACs either: Thierry explained that when a file removal is requested, both GDACs have to perform the removal within a week, otherwise the bad files will return during the next synchronization process. File removal was working well at French GDAC but was chaotic at US-GDAC and therefore bad files were coming back again and again. Some DACs mentioned that the greylist at the US-GDAC was also not up to date. Moreover, since August 7th 2012, Coriolis files are being distributed in the Argo new format version (profiles and trajectory version 2.3; technical data version 2.4). Unfortunately, these files are being rejected by the format checker at the US-GDAC. The provision of data in the new format was dictated by a model change in the internal Coriolis database. This move to version 2.3 was planned for early 2012 and is mandatory to distribute bio-geochemical and surface data as required by AST in 2011. Most DACS are ready and are waiting for GDACS to handle this new format. Thierry pointed out that US-GDAC could easily accept such data by installing the configuration file for the present file checker that he provided this summer.

A discussion on that situation arrived to the conclusion that we cannot further delay the delivery of these new types of data. The DACs ready to go ahead should be able distribute their data with the new formats.

Therefore it was agreed to run the following emergency scenario to restore good data provision to the users and relax pressure on US-GDAC so that Mark and his team can focus on the developments that need to be finalized. All data submission from DACs to US-GDAC should be suspended. The US-GDAC will mirror the content of French GDAC and in that way be able to serve the same Argo data to users.

Therefore

- US-GDAC will stop collecting data from DACs
- Coriolis GDAC will stop synchronization with USGODAE
- US-GDAC will backup its present GDAC data holding (Argo directory ftp://usgodae.org/pub/outgoing/argo)
- US-GDAC will replace the US-GDAC Argo directory with a recent copy provided by French GDAC
- US-GDAC will perform twice a day (or more) a synchronization process with Coriolis : All new or updated files from Coriolis will be collected and copied to the US-GDAC

The file data removal and the greylist updates need to be upgraded at the US-GDAC. Coriolis will provide all the removal command files that will need to be processed by the US-GDAC. Coriolis will provide a daily copy of the greylist file to US-GDAC

Before returning to full functioning as a GDAC, the US-GDAC has to upgrade the GDAC to perform the following tasks and make them to operational:

- Automate Update of the GreyList
- Automate implementation of the File Removal operations
- Provide a detailed Index-file
- Accept multi-axis format files
- Accept compressed files (.tar.gz)
- Provide authorization for the DACs that change their server IP address
- Resynchronize with French GDAC
- And implement all the planned upgrades that will be implemented at French GDAC

The target date for having the US-GDAC functional again is the AST14 but if Mark and his team needs more time, there was an agreement that restoring the robustness of the US-GDAC had higher priority than meeting the AST14 deadline.

7.2.1 Status of operation at French GDAC

Currently, 11 national DACs submit data regularly to the French GDAC. On November 5th, the following files were available from the GDAC FTP site. The number of files grew by around 15% compared to last year.

DAC	metadata files	increase from last year	profile files	increase from last year	delayed mode profile file	increase from last year	trajectory files	increase from last year
AOML	4 366	11%	535 645	16%	398 027	24%	4 236	11%
BODC	402	16%	37 274	16%	30 329	0%	383	16%
Coriolis	1 466	10%	127 401	16%	90 715	10%	1 382	11%
CSIO	127	27%	8 388	49%	5 879	20%	124	25%
CSIRO	533	14%	65 215	32%	35 006	11%	527	15%
INCOIS	274	16%	33 006	16%	21 061	2%	272	15%
JMA	1 144	7%	128 402	11%	83 666	10%	1 131	8%
KMA	161	10%	15 904	18%	9 982	0%	145	11%
KORDI	119	0%	14 142	22%	0		119	0%
MEDS	344	9%	35 639	11%	23 261	4%	336	8%
NMDIS	19	27%	1 193	81%	0		19	27%
Total	**8 955**	**11%**	**1 002 209**	**17%**	**697 926**	**16%**	**8 674**	**11%**

One million profiles have been available on the Argo GDAC ftp server since October 30th 2012. The GDAC millionth profile arrived on 31/10/2012 at 16:50:07. It was transmitted by University of Washington float 5901891, cycle 147. It is NOT the Argo millionth profile, it is the GDAC millionth profile.

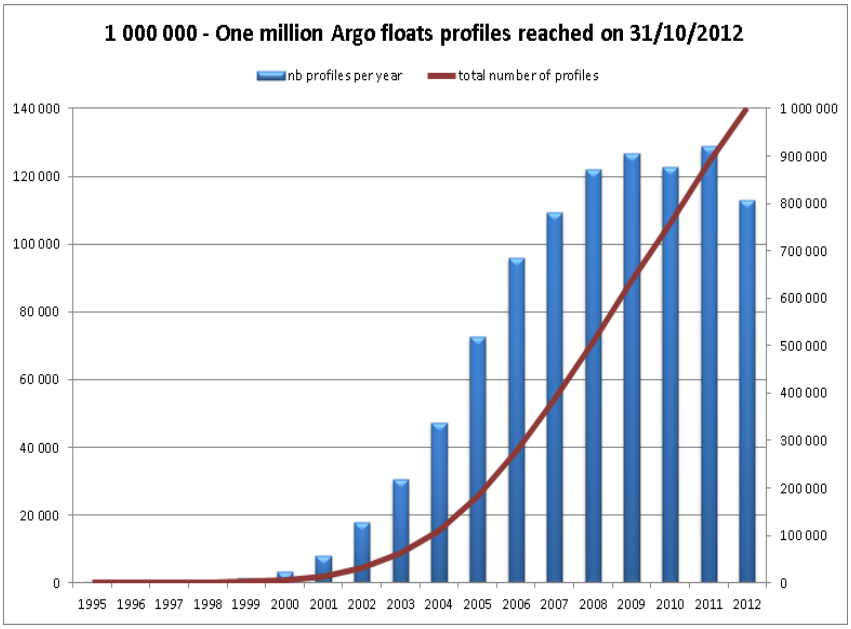


Figure 2 Number of profiles on GDAC, distribution per year

Files submitted by DACs are automatically collected from the national DACs directories every 30 minutes. The index files of metadata, profiles and trajectories are updated every 6 hours. French GDAC plans to move to hourly updates of the index files.

There is a monthly average of 285 unique visitors, performing 2397 sessions and downloading 1614 gigabytes of Argo data. In April 2012, the Ifremer FTP server was upgraded. The reliability increased as well as the data transfer speed. The electrical power supply upgraded last year proved to be reliable (no interruption). The ftp server was available for 99.98 % of the time (compared to 99.69% last year). The 0.02% of failure represents 113 minutes of interruption (compared to 27 hours last year). Compared to last year, the new ftp server dramatically decreased the files transfer time from 100ms to 4 ms: the files are downloaded up to 25 times faster.

According to the project requirements French GDAC hosts a grey list of the floats which are automatically flagged before any automatic or visual quality control. The greylist has 1384 entries (November 5th 2012), compared to 1181 entries one year ago.

8 Format Issues

8.1 Status on Tech Files updates (Actions 38,42)

After several years of effort, we are seeing significant improvement in the contents of the technical files. There are still some outstanding issues, however. These include trajectory information remaining in the technical files (eg, TEMP_AscentStartPlusTwoSeconds_DegC), variables with existing names but different names have been used (eg TIME_SinceStartUp_ should be used, not TIME_SinceStart_), files with a dimension error so they are unreadable, or names that contain a typographical error which was present in an earlier version of the technical table (two cases of lower case 'p' where 'P' was correct). The number of these errors has decreased markedly and thanks to everyone for their hard work on this. All text files listing these failures are available and will be sent by Ann to the individual DACs.

8.2 Iridium metadata at AIC and in GDACS metafiles

Iridium IMEI metadata has been requested by the AIC and is currently held in the metadata files. However, it has been decided that we cannot hold or serve that information because it violates US policy and puts at risk the security of the floats. Therefore, we will remove the entry from the metadata file and, if the IMEI is held at the AIC, it will not be publicly available.

8.3 Status on Meta-Files Update

Esmee reviewed the new format of the metafiles agreed at ADMT13. A number of issues were discussed:

- The community consensus is to remove IMEI numbers from the metafile as they pose a security risk, PI's can still provide this information to AIC for tracking purposes if they wish but this will not be distributed.
- Keep TRANS_SYSTEM_ID variables in the metafile, it is up to the individual DAC as to how they fill this field.
- Remove the redundant INST_REF fields from the profile and traj files.
- Remove BATTERY_PACKS from the mandatory variable list and make this highly desirable instead.
- Remove SAMPLING_MODE from the meta file and put this in the profile file so that it can be differentiated for multi-profile floats. Sampling mode can vary between profiles in the same file and so will be discussed further before a final treatment is defined.
- The reference table for ARGO_GROUP is to be redefined and circulated to ADMT group with advice from AST.
- The CONFIGURATION_MISSION_NUMBER variable in the traj file will be renamed to CONFIG_MISSION_NUMBER, so that naming is consistent and this variable will also be added to the profile file.
- Esmee will maintain the list of approved CONFIG Variable Names.
- To create a standardized format ID, each DAC is asked to create a webpage listing an example of each type of their float manuals and linking these to the FIRMWARE_VERSION, MANUAL_VERSION and DAC_FORMAT_ID. This can be complicated for some floats which contain definitions of more than one format in the same manual (some Provors).

- With the advent of Near Surface Temperature and Bio Argo floats, the number of required metadata and configuration variables will increase considerably. These two communities should start considering which variables are required for their float types now.

Action Items:

- Mathieu and Esmee will circulate proposed new standard reference tables to Argo mailing lists after ADMT13 for feedback.
- At least one person from each DAC should be nominated as the contact person for metadata
- Each DAC is to make their float data types and manuals available online, i.e. webpage for each DAC hosted at AIC site.
- Bio Argo and NST communities need to check the metadata section of the manual and the configuration table and decide and advise which (new or existing) variables are required for their floats.

8.4 Multiple sensors and multiple axes: Status of implementation

Thierry presented the status of the implementation of multiple sensors and multiple axes in Argo profile files. Note that all new formats will now be version 3.0. The new format 3.0 is absolutely necessary to handle oxygen, Bio-Argo or high resolution surface profiles.

A discussion on the implementation of the new data format arrived to the following conclusion:

- Each DAC has its own schedule for format change
- When the DAC provides data in a new format, all its files should be upgraded to the new format in a reasonable time period.
- The floats featuring classical sampling schemes (one mission, 2000dbar profile) will be upgraded by the GDAC that will run a script to transform 2.2 profile files into 3.0 profile files. The vertical sampling scheme will be dependent on the float family (Provor, Apex, SOLO).
- The floats featuring different sampling schemes will not be upgraded by the GDAC.
- The DAC will re-submit the files, probably when the float's delayed mode profile will be submitted.

Currently the multi-profile files generated by the GDACs cannot handle the multiple profiles in the new version 3.0 files. This will require a month of work before Coriolis can generate these files from the new formats and they will contain only the main CTD profile.

8.5 Implementation of CF compliance Action 41

The new versions of Argo files are CF compatible - this is achieved by adding 4 global attributes and 3 variables attributes: long_name, standard_name, axis. All files that are version 3.0 or higher will now be CF compliant.

// global attributes:
:data_type = "Argo vertical profile" ;
:format_version = "3.0"
:user_manual_version = "3.0" ;
:Conventions = "Argo 3.0 CF-1.4" ;
double JULD(N_PROF) ;
JULD:long_name = "Julian day (UTC) of the station relative to REFERENCE_DATE_TIME" ;
JULD:standard_name = "time" ;
JULD:units = "days since 1950-01-01 00:00:00 UTC" ;
JULD:conventions = "Relative julian days with decimal part (as parts of day)" ;
JULD:_FillValue = 999999. ;
JULD:axis = "T" ;

8.6 ACDD - Attribute Convention for Dataset Discovery

The ACDD convention could be adopted by Argo data files (Attribute Convention for Dataset Discovery). It is complementary to NetCDF-CF. It would enhance the availability of Argo data making it easier to harvest by catalogues or interoperability systems. The ACDD compatibility may be added by a script run on the GDAC that would add the relevant global attributes in each NetCDF file. Thierry will investigate whether it is possible to automatically populate these attributes based on the file contents.

Here is a tentative ACDD global attributes for an Argo profile file

WHAT	
data_type	data_type=”Argo profile data”
format_version	format_version=”3.0”
platform_code	platform_code=”6900495”
date_update	date_update=”2006-04-11T08:35:00Z”
institution	institution=”CNRS-LOCEAN”
institution_edmo_code	Institution_emo_code =”1042”
wmo_platform_code	wmo_platform_code=”61864”
source	source=”float observation”
history	history= “2008-12-10T09:35:36Z Written by MATLAB script floatFV.m v1.2
data_mode	data_mode=”R”
quality_index	quality_index=”excellent”
references	references=”http://www.argodatamgt.org”
comment	comment=”This deployment was performed during the Latex exercise”
Conventions	Conventions=”CF-1.4 Argo-3.0”
Netcdf_version	netcdf_version=”3.56”
title	title=”6900495 float data on Latex deployment”
summary	summary=”Oceanographic float data from float deployed in gulf of Lion, North-West Mediterranean sea, in 2010. Measured properties: temperature, salinity, oxygen, turbdity.”
Abstract	Abstract = “float data from the oceans around Australia have been
Keywords	chlorophyll, organic matter, oxygen,fluorescence, scattering,water temperature,fluorescence, scattering
naming_authority	Naming_authority=”ARGO”
id	id=”a DOI ???”
cdm_data_type	cdm_data_type=”Profile”
WHERE	
area	area=”North West Mediterranean Sea”
geospatial_lat_min	geospatial_lat_min=”59.8”
geospatial_lat_max	geospatial_lat_max=”59.8”
geospatial_lon_min	geospatial_lon_min=”-41.2”
geospatial_lon_max	geospatial_lon_max=”-41.2”
geospatial_vertical_min	geospatial_vertical_min=”10.0”
geospatial_vertical_max	geospatial_vertical_max=”200”
WHEN	
time_coverage_start	time_coverage_start=”2010-07-01T00:00:00Z”
time_coverage_end	time_coverage_end=”2010-09-18T23:59:29Z”
WHO	
institution_references	institution_references=”http://www.insu.fr”
contact	contact=”laurent.beguery@dt.insu.cnrs.fr”

author	author=”Thierry Carval”
data_assembly_center	data_assembly_center=”Coriolis”
principal_investigatorpi_name	principal_investigatorpi_name=”Laurent Mortier”
principal_investigator_email	principal_investigator_email=”Laurent.Mortier@upmc.fr”
Observatory	observatory = “North west Mediterranean sea”
Deployment	deployment="MooseT00_19"
HOW	
distribution_statement	distribution_statement=”Follows CLIVAR (Climate Varibility and Predictability) standards, cf. http://www.clivar.org/data/data_policy.php. Data available free of charge. User assumes all risk for use of data. User must display citation in any publication or product using data. User must contact PI prior to any commercial use of data.”
citation	citation=”These data were collected and made freely available by the ARGO project and the national programs that contribute to it.”
update_interval	update_interval=”daily”
qc_manual	qc_manual=”http://www.argodatamgt.org/document/quality_control_manual.pdf”

8.7 Status on Oxygen Data resubmission - Action 44

Most DACs are up to date on this action but CSIO, KORDI and KMA still have some work to do.

8.8 Update on the data management of O2 data: RTQC and new parameters

8.8.1 Names for the new telemetered variables

Some Argo floats have been recently equipped with new DO sensors : the Aanderaa optode 4330 and the Seabird SBE63. The telemetered data used to calculate DOXY (DO estimate in micromol/kg) are different than the ones used by the other existing sensors. We thus defined new names for the corresponding telemetered data :

- Aanderaa optode 4330 sensor
  - TPHASE_DOXY when Aandera optode 4330 output is TCPhase (Unit=degree)
  - C1PHASE_DOXY and C2PHASE_DOXY when Aandera optode 4330 output is C1Phase and C2Phase (Unit=degree)
- Seabird SBE63 sensor
  - PHASE_DOXY when SBE63 output is a phase (Unit= micro sec)

Do we need to allow the parameter MLPL_DOXY in when some floats transmit the DO concentration in ml/l? Shall we use another name ? Those questions will be posted on the argo-dm mailing list.

The 256 characters allowed for the ‘PREDEPLOYMENT_CALIBRATION_EQUATION” and “PREDEPLOYMENT_CALIBRATION_COEFFICIENT” fields are not enough to store all the coefficients (20 coefficients in some cases). We thus decided to increase the maximum length of the fields to 1024 characters.

8.8.2 Adjusted fields and QC for the XXX_DOXY parameters

Raw data transmitted by the oxygen sensor are stored with the meaningful names in the following form XXX_DOXY. It was agreed that those raw parameters will have no ADJUSTED fields and that <PARAM>_QC = “0” and PROFILE_<PARAM>_QC = “ “ for those variables.

> Action – the GDAC format checker will need to pass files without an adjusted field for these raw telemetered variables but reject files where the derived variables do not have an adjusted field.

8.8.3 Real Time QC tests

RTQC checks are required to flag obviously bad data that pollute the Argo-O2 dataset. Virginie proposed to apply the following tests to oxygen data :

Test 6: Global range test

- Oxygen in range 0 to 600 µmol/kg : QC flag set to "1" (GOOD DATA)
- Oxygen in range [-1 0] µmol/: QC flag set to "3" because some of those values are potentially correctable (low reading sensors in oxygen minimum zone).
- Oxygen out of range [-1 600] µmol/kg : QC flag set to "4",BAD DATA

Test 9: Spike test

Test value = | V2 − (V3 + V1)/2 | − | (V3 − V1) / 2 |

where V2 is the measurement being tested as a spike, and V1 and V3 are the values above and below

The V2 value is flagged (QC flag set to 4) when

- the test value exceeds 50 µmol/kg for pressures less than 500 dbar or
- the test value exceeds 25 µmol/kg for pressures greater than or equal to 500 dbar

Test 11: Gradient test

Test value = | V2 − (V3 + V1)/2 |

where V2 is the measurement being tested, and V1 and V3 are the values above and below.

The V2 value is flagged when

- the test value exceeds 50 µmol/kg for pressures less than 500 dbar or
- the test value exceeds 25 µmol/kg for pressures greater than or equal to 500 dbar

Test 13 : Stuck value test

The following tests have not discussed but they might be useful

Test 7: Regional range test: Follow range test used in WOD? Johnson et al 2006

Test 10: Bottom and top spike test

Test 12: Digit rollover test

Test 16: Gross oxygen sensor drift

The tests and the thresholds values will probably evolve based on DMQC experience and if the definition of those tests evolve for these and other parameters.

Thierry has already updated the QC manual to include these new RTQC tests for oxygen data. It is also clear that we will need a new way to store data_mode for secondary variables and profiles. Currently, the data_mode is a single variable and applies only to the primary profile but you might have a mix of D or A mode variables in a file and different status for the same variable in different profiles. Brian King will make a proposal for discussion on this issue.

9 Trajectory issues

9.1 Summary on the final agreement for traj format Version 3

John presented a proposed trajectory V3.0 at the ADMT 13 coordinated by Megan with a lot of input from Jean-Philippe Rannou based on ANDRO experience. This version is an update to the currently accepted V2.3. The modifications allow for the ANDRO dataset being included fully within the file, eliminating the need for the 'Traj2' format. At the same time, modifications bring the trajectory file into "best practice" alignment with other Argo NetCDF formats.

The ADMT suggested a number of changes from the version sent out previous to the meeting, including the merging of the two 'Grounding' variables and the reworking of the cycle number variables to follow general Argo practice of having pairs of variables when the raw value is allowed to change. These suggested changes will be made to the format. All other major modifications discussed at the meeting were accepted.

Final modifications to the document will be made by the end of 2012, allowing for the transfer of ANDRO to the format by Coriolis. This will only include data through 2009; DACs will need to carry the reprocessing forward to the present.

It was proposed that float manufacturers be made aware of the important timing events that are required for proper determination of float timing. The minimum amount of timing information necessary is represented by the 8 mandatory measurement codes (MC). These are…

Descent Start Time	(DST, MC=100)
Descent End Time	(DET, MC=200)
Park (Drift) End Time	(PET, MC=300)
Deep Descent End Time	(DDET, MC=400)
Ascent Start Time	(AST, MC=500)
Ascent End Time	(AET, MC=600)
Start of Transmission	(TST, MC=700)
End of Transmission	(TET, MC=800)

However it is recommended that a greater amount of timing information be returned by floats during all phases of the float mission. Very valuable timing information include time series of pressure throughout all mission phases, the times of buoyancy adjustments, and occasional P,T,S triplets during non-profile phases.

Some variables will only be filled in delayed mode and we need to be able to keep track of the data_mode of the data within these files. The new formats will also require an adjusted field for many of the variables, including JULD which can be adjusted for clock drift or other clock errors.

9.2 DAC Instruction/cookbook

The tentative DAC Cookbook was presented to the ADMT 13. As the basic outline of the V3.0 trajectory format was acceptable to the ADMT, the DAC Cookbook can be finished by Megan and Jean-Philippe at the end of 2012 with the requested modification.

A very general overview of the contents of the cookbook was presented as well as tips on accessing information within the document.

A number of remaining questions regarding ‘best Argo practice’ that required ADMT input were presented. Some feedback was obtained although some questions remained unanswered. For these remaining questions, gaining feedback from the manufacturer has been unsuccessful. However, Jean-Philippe will be informed of the available answers allowing movement forward with TrajV3.0 and the DAC Cookbook.

DACs should be aware that this format might evolve further but the basics are there now.

9.3 Reprocessing of Trajectory from ANDRO DEP files (Megan/John with discussion)

Megan is uncomfortable with the mismatch between our NetCDF files and ANDRO, so the new traj format 3.0 will contain all of the information currently in ANDRO, negating need for traj2 files. As soon as we finalize the new formats, we can produce trajectory files from the DEP files through 2009. After the meeting Jean-Philippe Rannou clarified the issue on the content of ANDRO related to Iridium floats. While Coriolis and JMA iridium floats have been reprocessed from iridium messages according to the instructions provided in the cookbook, it has not been possible for Iridium floats from AOML as Jean-Philippe didn’t get access to RUDICS messages. Therefore for these floats some timing information is missing and it would need a complete reprocessing by AOML to be able to fill in all the information described in the cookbook.

It is clear that we will have traj format 3.0 and traj format 2.2 version files co-existing for a while. Some floats will be completely done by conversion from ANDRO – these are the ones that were dead before 2009. But these files need to be checked by the DM operator in order to validate and check the ANDRO results, independently of the existence of delayed-mode traj files. Floats that are partially in

ANDRO or started after ANDRO will be a mix and we will need to reprocess data in the time period from 2010 to the day of transition to traj format 3.0

Options: We can rely on the DACs to do it all, we can potentially get shared code from others to help with the transition, or we can only create traj format 3.0 files after the float is dead. In any case, we need a deadline where data must go directly into v3. How quickly can this all be done?

Note that the cookbook does not address DMQC for these files which will need to be done separately. This activity has to be clearly defined at AST level and depends on getting an improved metadata file.

DACs will need time to begin conversion. Most estimate that it will take them around 6 months for Real Time data stream but processing the backlog will take longer.

9.4 Status on correction of the anomalies detected by ANDRO team in the DAC processing

We still need to prioritize work on the errors detected by JP Rannou and the highest priority will be those floats that are still working.

10 ARC status

10.1 North Atlantic ARC

NA-ARC activities mainly concern:

Products delivery: Data synthesis over the North Atlantic (F. Gaillard, T. Reynaud, G. Maze, V. Thierry, C. Cabanes)

The synthesis of the state of the North Atlantic is based on global Near-real time objective analysis of Argo data. Maps on regular grids are produced (Annual mean T & S anomalies at different depths, mixed layer depth,…). Time series plots are also available at several locations. Maps and plots are available on a web site (http://wwz.ifremer.fr/lpo/SO-Argo-France/Products/North-Atlantic-T-S) and the data are available on request (fabienne.gaillard@ifremer.fr) and updated on a yearly basis.

- Tools : Information and data mining tool for North Atlantic Argo data (G. Maze)

This is an interactive user interface for Argo data mining that centralizes as much as possible information provided by other services or web sites. It provides simple access to a database, updated every day, which contains meta-data to explore and select Argo profiles. It is possible to select profiles by geographic area, date, parameter, QC, etc… and make statistics, charts, visualize profiles or it is possible to get scripts to download NetCDF profiles directly from GDAC ftp servers or use the web API. The tool is available on the following web site (http://www.ifremer.fr/lpo/naarc)

- Consistency check of delayed mode analysis in the North Atlantic (C. Cabanes, V. Thierry, C. Lagadec)

The main purpose is to evaluate the confidence that we can have on salinity corrections estimated by the OW method in the North Atlantic. In particular, what are the amplitudes of biases and drifts that can be detected by the OW method? And which uncertainties shall we set for salinity data in the North Atlantic ? 0.01 PSU or more? We first started with the floats deployed during the OVIDE cruises. 44 PROVOR floats have been through delayed mode analyses (OW method) and only 4 floats have been corrected for salinity bias or drift. We considered that the other ones do not need corrections (according to careful comparison of float profiles and nearby CTDs, including CTD made when the float was launched and theta/S diagram analysis). However the OW method often suggests a saline bias for these floats even if the configuration was fine tuned for the North Atlantic region. In particular systematic saline biases of the order 0.02-0.03 PSU are often suggested along the ridge and the topography in the Labrador Sea.

Next, we have to figure out why the OW method generally suggests saline bias for the profiles close to the Greenland and Labrador topography, and fresh bias in the Gulf Stream region (configuration parameters? Decadal variability not well captured in the CTD reference database?). Finally, we will provide some bin statistics for those biases.

10.2 South Atlantic ARC:

The SA-ARC deployed 55 floats in the region and worked on deployment planning for a cruise on the Lady Amber to fill areas with relatively low float density in the South Atlantic. The SA-ARC also completed the data processing for the consistency check of all floats passing through the SA-ARC region on October 17. The results are currently being evaluated. The SA-ARC continues updating the products on the web page, that include annual and semi-annual means of temperature, salinity and dynamic height along zonal and meridional sections, maps of the mixed layer temperature, thickness and heat storage rate as well as maps of geostrophic based on altimetry. More information on the SA-ARC can be found in the US national report (Annex 5)

10.3 MedArgo ARC

Giulio Notarstefano presented the Argo Regional Centre for the Mediterranean and Black Sea (MedArgo). MedArgo has been officially recognized as an ARC in 2012 and its main responsibility is the overall coordination of profiling float operations in the Mediterranean and Black Seas. The data management was done by the Coriolis DAC. MedArgo activities are related to the coordination of float deployments, the preparation and distribution of Argo products; moreover, it serves as a Delayed Mode Operator (DMO) for the delayed-mode processing of the Argo data with specific QC tailored for the Mediterranean and Black Seas.

Since 2000, with the first float deployments, 151 floats, belonging to different countries and projects, have been deployed in the Mediterranean and Black Seas. There are more than 13000 profiles, well distributed in the various sub-basins of the Mediterranean Sea. The temporal distribution of these Argo profiles shows that since 2005 the sampling of the Mediterranean Sea is quite well distributed in most of the sub-basins. An almost constant quantity of 180 profiles per month is evident since April 2012 and this number is expected to increase next year in response to the new deployments. The quantity of floats per month reached its maximum in August 2012 with 36 floats running simultaneously.

Argo products are posted in NRT and on a monthly basis on the MedArgo web site: the latest positions of the alive floats and the tables that report the status of floats with their main parameters (like the float model, WMO number, cycle length, deployment location and date, last position, status, ...) are updated daily; monthly floats tracks are updated every month; daily and weekly maps of Mediterranean ocean forecasting system are also produced. 22 floats were deployed in 2012 by 4 countries (Spain, France, Germany and Italy) in the Med and Black Sea. These floats were deployed in crucial areas of 4 different sub-basins of the Med and also in the Black Sea, in order to maintain the spatial coverage as much homogeneous as possible. Another 9 floats will be soon deployed this year (5 Italy, 1 Germany, 3 NAVO) and so the total number of 2012 deployments is around 31 new floats. About 40 floats will be deployed in 2013: 33 in the Mediterranean Sea and 7 in the Black Sea, including the contributions of many countries. It is expected that the total number of floats will be approximately around 80 units (including about 20 floats equipped with biogeochemical sensors), that is double with respect to the conservative minimal density recommended in EuroArgo Pilot Project and about double with respect to the global Argo density.

The DMQC of Argo data is regularly performed. Additional historical reference data for the Mediterranean have been recently uploaded and also some Argo reference data have been added. The OW method has been applied in conjunction with other qualitative checks in order to quality control the float salinity. The DMQC has been applied to about 75% of the floats which died between 2000 and 2012 in the Mediterranean Sea: they were quality controlled in delayed-mode for salinity, temperature and pressure and the respective D-files were sent to GDAC (not all the D-files were sent yet to GDAC because some floats need a more accurate analysis). In particular, for the Apex floats equipped with previous versions of Apf-9 controller the method was applied (in 2011) and 5 floats

were classified as Truncated Negative Pressure Drift (TNPD). So far, the majority of the delayed mode checked floats can be considered as well calibrated. The DMQC report of each float can be downloaded by the MedArgo web page.

10.4 Pacific ARC:

No representative of the Pacific ARC was present.

10.5 Southern Ocean ARC:

Four organizations participate in the Southern Ocean Argo Regional Centre - BODC (Atlantic Ocean Sector), CSIRO ("Australian sector"), JAMSTEC (Pacific Ocean Sector) and the University of Washington (Indian Ocean Sector).

BODC hosts the main data and information web pages. These pages contain an animation of the Forecast Ocean Assimilation Model (FOAM) outputs (potential temperature, salinity and velocity at five metres and 995.5 m) and an interactive map giving information on last known positions, deployment positions and direct links to both GDACs ftp sites.

Re-establishing a link to submit profiles to CCDHO is on-going and the aim at BODC is to automate delivery. The goal is for these to filter through to the Argo delayed-mode QC reference data. It is still hoped ease this restriction in due course. The routine submission of CTD profiles to CCHDO when they are banked at BODC is the eventual goal, negotiations are complete and just the technical development is required to make this operational.

Partnership for Observation of the Global Oceans (POGO) work has continued with development of routines to automate the collection and submission of cruise plans to POGO. This effort has been enhanced in Europe due to the EU-funded EUROFLEETS project. The SIDERI project is also looking to use POGO to collect research vessel itineraries for the purpose of cruise planning. This is semi-automatic for the US University-National Oceanographic Laboratory System (UNOLS) managed ships whilst the data are publicly accessible. It is hoped to extend this method of collection of data to UK and German research vessels next.

10.6 Indian ARC:

As part of the ARC activities of Indian Ocean, INCOIS has undertaken the following activities:

1. Archiving of temperature and salinity profile data from floats deployed by Indian and other countries in the Indian Ocean and making them available through Web-GIS.
2. Designed and developed DVD for supplying Argo temperature and salinity data to students and other researchers with low bandwidth capabilities. These DVDs are built with a GUI that has similar capabilities to that of a Web-GIS. As many as 125 DVD were sent free of cost to the users up on request.
3. Performing delayed mode quality control of all the Indian floats, identifying floats with sensor drifts and correcting the same. Collected high quality CTD from various sources (contacting the chief scientist of various cruises undertaken on Indian Research Vessels). Supplied some of the CTD obtained this way to the NODC, USA and Coriolis for making the reference data bases which will be used by other DACs to perform DMQC.
4. Conducted User Interaction workshops to bring awareness about the data and also to encourage the use of Argo temperature and salinity data.
5. Generating value added products based on gridded products obtained from Objective and Vibrational Analysis methods. These value added products are made available on the web and also on the Live Access Server.

11 Delayed mode data management

11.1 Review of DMQC status

Updates to the Argo QC Manual that were requested at ADMT 12 were completed. No new business was discussed for Delayed mode activity.

The backlog of delayed mode data files reported at the ADMT 13 is 21%. This value is based on floats 'eligible' for delayed mode after 12 months. Roughly 2/3 of the backlog originates from a small subset of principle investigators.

Decreasing Percentage of Backlog by DAC												
	NMDIS	**KORDI**	**CSIRO**	**JMA**	**MEDS**	**INCOIS**	**KMA**	**Coriolis**	**AOML**	**BODC**	**CSIO**	**Total**
# of D-Files (older than 12 months)	0	0	33,887	115,918	32,250	20,999	13,541	88,184	391,437	30,329	5406	**684,367**
# of Eligible D-Files	721	13,299	49,940	80,905	23,238	28,591	9982	110,837	466,157	32,356	5701	**869,311**
% Backlog	**100.0**	**100.0**	**32.2**	**30.2**	**27.9**	**26.5**	**26.3**	**20.4**	**16.0**	**6.3**	**5.2**	**21.3**

Decreasing Number of Backlog by Principle Investigator												
PI Name	Horton (Argo eq. NAVOCEA	Steve Riser	Susan Wijffels	JAMSTEC	Moon-Sik Suk	Breck Owens	Greg Johnson	Kensuke Takeuchi	Muthalagu Ravichandran	Bob Molinari	Alaine Serpette	Carl Szczechowski
# of D-Files (older than 12 months)	319	122,660	33,890	57,422	0	85,226	60,478	8662	633	0	612	0
# of Eligible D-Files	25,827	142,258	49,978	72,183	13,176	94,441	68,483	14,173	5414	3929	3879	2797
# Backlog	25,508	19,598	16,088	14,176	13,176	9215	8005	5511	4781	3929	3267	2797

Scripps Institution of Oceanography runs a limited format check on delayed mode files found on the GDACs. As of November 5th, 2012 there remain 1.5% of DATA_MODE='D' profile files with format errors. Progress on reducing this backlog has been stalled at most DACs for the past 2 years.

	AOML	BODC	Coriolis	CSIO	CSIRO	INCOIS	JMA	KMA	KORDI	MEDS	NMDIS	Total
<PARAM_ADJUSTED_QC> == '0' or ' '			1			4		18		1077		
<PARAM> == FillValue but <PARAM_QC> ~= '4','9'	11			7			4	27				
POSITION_QC == 0 or ' '	5			1								
PROFILE_QC flag is bad (for example: not A-F)	25				1							
<PARAM_ERROR> variable == ' ', but <PARAM_QC> ~= '4','9'	42			36			3182	427		323		
<PARAM_ERROR> variable == '0'								849				
"9' flag inconsistent between <PARAM> and <PARAM_ADJUSTED>	3584		144			6	190	11		143		
Total	3667	0	145	44	1	10	3376	1332	0	1543	0	10118
Percentage of DACs Dmode Files	1	0	1	1	<1	<1	4	13	NaN	7	NaN	1.5%
Total Change from Last Report	-1	0	-322	0	0	0	0	0	0	-176	0	-499

Action: DM Operators to correct the DFILES before AST14

Orphan floats remain without a delayed-mode operator. These orphan floats were presented to the ADMT, and a request was made for adoption. A few Argo programs have a DM-operator as delayed mode files are being processed, but the DM-operator is not listed in the AIC database. Coriolis has volunteered to adopt Provor floats from Argo eq. FSU. Giulio Notarstefano has volunteered to adopt Navy floats within the Mediterranean Sea.

Delayed Mode operators were identified for the following floats

Argo Finland	BSH/Marek Stawarz
Argo Poland	BSH/Marek Stawarz
BulArgo	OGS/Giulio Notarstefano
EuroArgo in Med Sea	OGS/Giulio Notarstefano
Argo eq. FSU	CORIOLIS/Christine Coatanoan (Provor Only)
Argo eq. UM-OSU	Emmanuel Boss?
Argo eq. NAVOCEANO	OGS/Giulio Notarstefano has volunteered to adopt Mediterranean Floats

The following floats remain unclaimed

Argo China SOA
Argo eq. AOML
Argo eq. NDBC
Argo eq. NAVOCEANO not in the Mediterranean Sea

11.2 Sharing of regional expertise

The sharing of regional delayed mode expertise has been attempted before and the process previously tended to identify transient issues such as:

- Out of date reference data
- Insufficient reference data

These are issues that should be reported to the appropriate members of the ADMT so the reference data can be updated. This activity with concentrate on separating transient issues from interesting or difficult oceanography starting at a European level under the SIDERI (Strengthening the International Dimension of the Euro Argo Research Infrastructure) project.

The output will be documentation of ocean areas where DMQC is difficult for oceanographic reasons e.g. Southern Ocean fronts, Red Sea water, etc. It also offers an opportunity for sharing of new or different approaches to DMQC. It is envisaged that these reports will have the following format

- Short reports (3-4 pages)
- Introducing oceanography with references
- Including an example of delayed mode

Such reports will act as primers for people new to particular ocean areas or in the training of new delayed mode staff. The timescale for this is relatively short, the project ending in late 2013. The results with be circulated on argo-dm-dm mailing list as several delayed mode operators in the meeting offered to review the output and potentially contribute (Breck and Esmee).

It was suggested to have a DMQC workshop either side of AST14 or ADMT14 or separated. Justin and Brian agreed to propose a first outline of the agenda and discuss with DM Operators on possible date and location.

12 GADR

Steve Diggs presented on behalf of Charles Sun the NODC contribution to the Argo program: support to Reference Data Base, and managing the archiving function of the Argo program. All the operations at GADR are running smoothly and more and more users are retrieving the data from NODC. Considering the issues regarding the completeness of US-GDAC data it was requested that GADR switch to French GDAC to assemble the monthly archive until US-GDAC is back on line (Action 46). Brian pointed out that at NODC only the raw parameters (PRES, TEMP, PSAL) were available in the multiprofile files. It was asked that the USNODC ensure that the multi--profile files they distribute contain the adjusted variables when present.

Finally Charles Sun mentioned that in 2013 USNODC was planning to explore if NODC's resources allow to migrate away from FTP based NetCDF file distribution to a THREDDS based distribution model. This would require adding additional attributes as defined in the Attribute Conventions for Data set Discovery (ACDD) conventions to the existing NODC Argo NetCDF conventions. ACCD conventions have the added benefit of being able to provide metadata in the THREDDS catalog that can be translated into ISO.

13 All other business

13.1 Summary of the 13th ADMT actions

Sylvie and Ann have elaborated an action list from the ADMT13 discussions and the list was reviewed, actors and deadlines identified and priorities set. It was agreed that to reach more timely accomplishment of the actions, bi-yearly phone meetings will be organized by the chairs in January, before AST14 and June involving mainly the DAC managers.

13.2 Location of next meeting

ADMT14 will be held at BODC in Liverpool/UK.

14 Annex 1 - Agenda

Wednesday 14th November

1. **Welcome address** by Dr SSC Shenoi, Director of INCOIS, MoESS (15mn)
2. **Feedback from 13th AST meeting** : *Susan Wijffels (30mn)*
3. **Real Time Data Management (3h)**

Status on the actions :18,19,20,22,23,24,25,26,27,28,29,30

- **GTS status**: 30mn
  - **Timeliness of data delivery: Review evidence provided by the MEDS statistics on the timeliness of data delivery via GTS**. (A Tran)
  - ***BUFR Format : Status on the experimentation phase and comparison with GDAC*** *data – Action 20-21-22 (M Ignaszewski)*
- **Status of anomalies at GDAC** (C Coatanoan) 20mn
- **Status on Anomalies detected with Altimetry** (S Guinehut) 20mn
- **Status on density test implementation** (Ann Thresher-Gronell to review) Action 23-23b 24(15mn)
- **Proposal for unpumped SST measurement RTQC** C Davis (15mn)
- **Argos System : feedback on the study on how to provide easier access to error ellipse data to DACs for new profile and history since 2008.** Action 25 Y Bernard(15mn)
- **Feedback on implementation of high resolution profile reduction for sending them to GTS as TESAC bulletins (C. Schmid to review)** Action 28
- **Finalize recommendation for bad data flagging for Provor floats that present the 2047db anomaly.** Cathy /Cécile Action 30

4. **Status of Argo Program and link with Users (1h)**

Status on the actions 1,2,3,4 ,43

- **Review of the Actions from last ADMT** (S Pouliquen) 15 mn
- **Argo Status + Real-time Monitoring :** Summary on major anomalies detected each month, Requested actions from DACs. Trying to identify why some anomalies are not corrected.(M Belbeoch)30mn
- **Citation Index for Argo Data** (Action 4,43)*(J Buck, T Carval) 10mn*

5. **Pressure Correction (1h00)**

Status on the actions : 7,8,9

- **CSIRO audit of technical, meta data and pressure corrections (**Susan Wijffels/Jeff Dunn)
- **Agreement on Pressure adjustment in Real-Time for non-auto-adjusted floats** (Ann Thresher-Gronell)

Thursday15th November

6. **Feedback on BIO-Argo Workshop H Claustre (1h00)**
7. **Progress on Argo Reference data base (1h00)**

Status on the actions 32,33,34

- **Summary of the actions since ADMT-12 (**C Coatanoan)
- **CCHDO-progress** (S Diggs)
- **NODC progress** (T Boyer**)**

8. **GDAC Services (1h00)**

Status on the actions : 10,11,12,13,14,15,16,17,42a,42b

- **Feedback on actions related to GDAC (File Removal, faster RT update, delay monitoring)** (T Carval, M Ignaszewski) Actions 9,10,11,12,13
- **What's new at Coriolis and US GDACs** (T Carval, M Ignaszewski)

9. **Format issues (1H30)**

While format is pretty well standardized for measurements and qc flags, experience at GDACS shows that there are discrepancies both at metadata and technical and history levels that ought to be resolved to the benefit of the community. Status on the actions : 35,36,37,38,39,40,41,43,44

- **Status on Tech Files updates** (Actions 38,42) (A Thresher-Gronell)
- **Iridium metadata at AIC and in GDACS metafiles** (M Belbeoch)
- **Status on Meta-Files Update:** Esmee Vanwijk / M Belbeoch
- **Multiple sensors and multiple axes : Status of implementation** (T Carval)
- **Implementation of CF compliance** Action 41(T Carval)
- **Status on Oxygen Data resubmission** - Action 44 **(**all)
- **Update on the data management of O2 data: RTQC, DMQC and new parameters** – V Thierry

10. **Trajectory from Argo data (2h00)**

Status on the actions 46,47,48,49,50,51,52,53,54,55,56,57,58,59,60

- **Summary on the final agreement on traj format Version 3** (Megan, J Gilson)
- **DAC Instruction/cookbook** *(M Scanderberg, J Gilson) 20mn*

Friday 16th November

11. **ARCs: provide an information on what done and what is planned (1h30)**
    - **Update on ARC progress** (ARCs leaders) 15mn each
        - **North Atlantic** Cecile Cabanes
        - **South Atlantic** Claudia Schmid
        - **Mediterranean Sea** Gulio Nortastefano
        - **Pacific Ocean** (TDB)
        - **Indian Ocean** Uday Bhaskar
        - **Southern Ocean** Justin Buck
12. **Delayed mode data management (1h00)**

Status on the actions 31

- **Review backlog of DMQC and Format Check feedback** (John)
- **Sharing of regional expertise Progress made with EuroArgo** (J Buck)
- **Updates to the Argo QC Manual** (A Wong)

13. **GADR (0h30) Status of the Archiving centre** (X on behalf of C Sun)

Coffee break

14. **Other topics (1h00)**
    - **Summary of the 13th ADMT actions (S Pouliquen A Thresher-Gronell) 30mn**
    - **Location of 14th ADMT at Liverpool in UK**

15 Annex 2 - Attendant List

N°	Name	Institute	Country
1	Dr Ann Gronell Thresher	CSIRO	Australia
2	Dr Susan Wijffels	CSIRO	Australia
3	Ms Esmee van Wijk	CSIRO Marine and Atmospheric Research	Australia
4	Ms Anh Tran	Integrated Science Data Management	Canada
5	Dr Guislain BECU	TAKUVIK University Laval	Canada
6	Dr Xiaogang XING	Ocean University of China	China
7	Dr Stephanie Guinehut	CLS	France
8	Mr Yann Bernard	CLS	France
9	Dr Cecile Cabanes	CNRS	France
10	Dr Herve CLAUSTRE	CNRS and UPMC	France
11	Dr Christine COATANOAN	IFREMER	France
12	Mr Thierry Carval	Ifremer	France
13	Mr Vincent Bernard	Ifremer	France
14	Ms Sylvie POULIQUEN	IFREMER	France
15	Dr Virginie Thierry	Ifremer LPO	France
16	Dr Fabrizio DOrtenzio	LOV CNRS	France
17	Dr Catherine Schmechtig	Observatoire Océanologique de Villefranche sur Mer	France
18	Mr Antoine Poteau	UPMC CNRS	France
19	Dr Jan Hinrich Reissmann	BSH Federal Maritime and Hydrographic Agency	Germany
20	Mr Marek Stawarz	BSH Federal Maritime and Hydrographic Agency	Germany
21	Dr Ravichandran M	INCOIS	India
22	Dr Satya Prakash	INCOIS	India
23	Dr TVS Udaya Bhaskar	INCOIS	India
24	Mr Giulio Notarstefano	OGS	Italy
25	Dr Taiyo Kobayashi	JAMSTEC	Japan
26	Ms Mizuho Hoshimoto	Japan Meteorological Agency	Japan
27	Dr Moon Sik SUK	KIOST Korea Institute of Ocean Science and Technology	Republic of Korea

N°	Name	Institute	Country
28	Dr KiRyong KANG	National Institute of Meteorological Research	Republic of Korea
29	Dr Joon Soo Lee	NFRDI	Republic of Korea
30	Dr Sandy Thomalla	CSIR	South Africa
31	Dr Justin Buck	BODC	United Kingdom
32	Dr Clare Davis	British Oceanographic Data Centre	United Kingdom
33	Dr Brian King	National Oceanography Centre	United Kingdom
34	Mr Stephen Diggs	Scripps Institution of Oceanography	United States of America
35	Ms Elizabeth Forteza	AOML CIMAS	United States of America
36	Dr Stephen Piotrowicz	NOAA	United States of America
37	Mr John Gilson	Scripps Institution of Oceanography	United States of America
38	Dr Kenneth Johnson	Monterey Bay Aquarium Research Institute	United States of America
39	Dr Claudia Schmid	NOAA	United States of America
40	Dr Breck Owens	Woods Hole Oceanographic Institution	United States of America

16 Annex 3 - ADMT12 Action List

PRIORITY: H: High R/ Routine L: Low

High High 19 :7 were done, 9 partially, 3 postponed and 2postponed waiting for DM File Checker

Routine: 18 were done, 19 partially, 4 not done

Action	Target Date	Responsible	Priority	Status	DONE
Monitoring Actions					
Each DAC to document their process for updating the GDAC and trace their delays	Jan 2012	Mathieu to coordinate with DAC help	R	BODC Done CSIRO, INCOIS, KORDI Done, Japan done, AOML: we monitor it (available online) Coriolis done	on going
AIC to report to ADMT mailing list on the GDAC delay issues	AST13	Mathieu	R	done from French GDAC Missing US.GDAC Will be provided by Mark before 16th July	on going
AIC Facilitate the reminder on pending issues	ADMT13	Mathieu	R	done routinely in AIC report	OK
Put a DOI on all approved Argo User Manual and Argo QC Manual	AST13	Lesley	R	DOIs not minted but progress report put together for ADMT13 and proposal for formatting of Argo DOIs,	Ok
Set up “DAC Instruction/cookbook” to gather procedures to be applied by DACS	AST13	Thierry, Megan, Ann , Claudia	R	Megan had mostly compiled information from the various float experts on how to calculate the cycle timing variables for their floats. The APEX float section is still not yet complete. Justin Buck and JP Rannou are providing inputs. Megan plans to have it finished before end of summer	Ok

Pressure Corrections					
CSIO and KORDI to update their tech file with the agreed standard names	AST13	CSIO KORDI	H	kordi done CSIO?	on going
DACS/DM Operators to provide feedback to CSIRO after checking the anomalies identified from audit (please refer to 25 Nov 2011 audit at: http://www.cmar.csiro.au/mr/argo/dmqc/audits_2011_11_25/index.html) ☐ No null values, ☐ No missing PRES_ADJUSTED or PRES_ADJUSTED_QC when PRES and PRES_QC exists and PRES_ADJUSTED_QC is not flagged as bad (This applies to all floats requiring surface pressure correction, DATA MODE "A" or "D").Surface pressure offset parameter names should not change during the lifetime of the float ☐ Fix cases when surface pressure correction varies throughout the profile (JMA/MEDS) ☐ For floats with legitimate multiple surface pressure offset parameter names: DAC to advise which parameter and method to use	ASAP and before AST13	All DACs	H	AOML: all issues in audit related to RT were resolved, changes were done if needed. Missing information from US DM operators for the other issues JMA: all issues in audit were resolved, changes were done if needed. JAMSTEC: in progress CORIOLIS :80% done CSIRO done BODC done INCOIS in progress Canada:done BODC - Use argo@bodc.ac.uk, Justin will be contact. AOML: use DM Operator Emails Paul Robbins + Annie Wiong + J Gilson + Kristene.E.Mctaggart@noaa.gov (PMEL) , JMA argoadmin@climar.kishou.go.jp JAMSTEC argomail@jamstec.go.jp CSIRO Done BSH: Marek.Stawarz@bsh.de Coriolis: Christine.coatanoan@ifremer.fr Canada:argo-canada@dfo-mpo.gc.ca BODC - n/a JMA done (so JAMSTEC done) CSIRO - done AOML: only minor changes were needed, suggested adding a few names to table (not only surface pressure related); Canada:done Coriolis : done INCOIS done Kordi done	on going

				BODC - Use argo@bodc.ac.uk, Justin will be contact. AOML: use DM Operator Emails Paul Robbins + Annie Wiong + J Gilson + Kristene.E.Mctaggart@noaa.gov (PMEL) , JMA argoadmin@climar.kishou.go.jp JAMSTEC argomail@jamstec.go.jp CSIRO Done BSH: Marek.Stawarz@bsh.de Coriolis: Christine.coatanoan@ifremer.fr Canada:argo-canada@dfo-mpo.gc.ca	
				done at Coriolis to be done at US GDACBODC - n/a JMA done (so JAMSTEC done) CSIRO - done AOML: only minor changes were needed, suggested adding a few names to table (not only surface pressure related); Canada:done Coriolis : done INCOIS done Kordi doneBODC - Use argo@bodc.ac.uk, Justin will be contact. AOML: use DM Operator Emails Paul Robbins + Annie Wiong + J Gilson + Kristene.E.Mctaggart@noaa.gov (PMEL) , JMA argoadmin@climar.kishou.go.jp JAMSTEC argomail@jamstec.go.jp CSIRO Done BSH: Marek.Stawarz@bsh.de Coriolis: Christine.coatanoan@ifremer.fr Canada:argo-canada@dfo-mpo.gc.ca	

Each DAC to nominate one or more contact persons who will deal directly with Jeff.Dunn@csiro.au in order to improve pressure correction in files and meta and tech information for pressure correction. RT and/or DM operators	ASAP and before AST13	All DACs	R	Will be implemented together with Format checker : Remark from Mathieu This information is really needed for AST as AIC need to present information on delays at Both GDACS at AST13 . Plan to provide it July 16thBODC - n/a JMA done (so JAMSTEC done) CSIRO - done AOML: only minor changes were needed, suggested adding a few names to table (not only surface pressure related); Canada:done Coriolis : done INCOIS done Kordi done	ok
DACS to remove obsolete Surface Pressure parameter names from files and ensure that only agreed parameter names are used.	AST13	Concerned DACs	H	Donedone at Coriolis to be done at US GDAC	on going
GDAC Actions					
ZIP files should be updated weekly and contained all index files. No need to zip Latest directory	ADMT13	Thierry and Mark	R	File checker is under test mode with AOML CSIRO CORIOLIS and BODC and JMA => Mark to add other DACS DoneWill be implemented together with Format checker : Remark from Mathieu This information is really needed for AST as AIC need to present information on delays at Both GDACS at AST13 . Plan to provide it July 16th	on going

Implement detailed index at US GDAC	AST13	Mark	H	feedback provided on the check by the testing DACS Coriolis : Thierry prefers to implement first the new format and then to work on the anomalies. AOML Add Claudi to the mailing list and Claudia to check BODC Justin will provide feedback before 20 June CSIRO done - good results from checker and files fixed JMA files have been tested and are fineDone in Coriolis, documented in Argo user's manual Hyderabad update.Done	nok
Create NMDIS DAC at US GDAC	December 1st 2011	Mark	H	waiting for the end of the testing period likely after summerFile checker is under test mode with AOML CSIRO CORIOLIS and BODC and JMA => Mark to add other DACS Done in Coriolis, documented in Argo user's manual Hyderabad update.	ok
GDAC to consider accepting compressed files from DACs	ADMT13	Thierry and Mark	L	Will be implemented together with Format checker . To speed up process Thierry to send the new format sample for Mark to check Since August 7th 2012, Coriolis files are distributed in the Argo new format versions (profiles and trajectory version 2.3; metadata and technical data version 2.4), unfortunately, these files are rejected by the US-GODAE server file format checker. The provision of data in the new format was dictated by a model change in the internal Coriolis database. This change was not related to Argo data-management. But, after the model change, only new Argo formats could be generated. The upgraded file format checker was sent on August 16th to usgodae; but it was not installed. feedback provided on the check by the testing DACS	ok

				Coriolis : Thierry prefers to implement first the new format and then to work on the anomalies. AOML Add Claudi to the mailing list and Claudia to check BODC Justin will provide feedback before 20 June CSIRO done - good results from checker and files fixed JMA files have been tested and are fineFile checker is under test mode with AOML CSIRO CORIOLIS and BODC and JMA => Mark to add other DACS	
Provide DM-Checker Documentation and provide to DACs access to Checker results	First week December	Mark	H	waiting for the end of the testing period likely after summerfeedback provided on the check by the testing DACS Coriolis : Thierry prefers to implement first the new format and then to work on the anomalies. AOML Add Claudi to the mailing list and Claudia to check BODC Justin will provide feedback before 20 June CSIRO done - good results from checker and files fixed JMA files have been tested and are fine	ok
DACs to scan the anomalies detected on their files and provide feedback to Mark if false alarm	December January	All DACs	H	JMA Done INCOIS :doneWill be implemented together with Format checker . To speed up process Thierry to send the new format sample for Mark to check Since August 7th 2012, Coriolis files are distributed in the Argo new format versions (profiles and trajectory version 2.3; metadata and technical data version 2.4), unfortunately, these files are rejected by the US-GODAE server file format checker. The provision of data in the new format was dictated by a model change in the internal Coriolis database. This change was not related to Argo data-management. But, after the model change, only new Argo formats could be generated. The upgraded file format checker was sent on August 16th to usgodae; but it was not installed. waiting for the end of the testing period likely after summer	on going

Installation of file checker at Coriolis and turn to operation	February	Mark and Thierry	H	DoneWill be implemented together with Format checker . To speed up process Thierry to send the new format sample for Mark to check Since August 7th 2012, Coriolis files are distributed in the Argo new format versions (profiles and trajectory version 2.3; metadata and technical data version 2.4), unfortunately, these files are rejected by the US-GODAE server file format checker. The provision of data in the new format was dictated by a model change in the internal Coriolis database. This change was not related to Argo data-management. But, after the model change, only new Argo formats could be generated. The upgraded file format checker was sent on August 16th to usgodae; but it was not installed.	ok
Update File-Checker to allows 2.3 and 2.4 files including multi-axis data to be submitted	February	Mark	H	DoneJMA Done INCOIS :done	nok
Real-time Actions					
Check Bulletin time (wrong time zone, or ?= bulletin time, or constant offset)	AST13	JMA, INCOIS, KMA	H	DONEDoneDone	ok

Bad or changing instrument codes over a float life. DACs who have their floats listed in Mathieu talk to check	AST13	Coriolis	R	DoneCoriolis done waiting for Mark feedback Mark doesn't see them but may be a subscription pb. Aurelie will send the header to Mark FNMOC doesn't see KMA, and NMDIS FNMOC Missing some BODC and INCOIS Mark to send the list of missing WMO to the DACS CSIRO BUFR files getting through - are all arriving? JMA files are being delivered Coriolis BUFR : UK and Germany see the Coriolis BUFR messaes. USGODAE and Meds do not see them. Ahn suggest that Coriolis uses a wrong buoy code for a float. We should IOPX01_LFVX and not IOBX01_LFVX, because IOBX01 is for drifting buoy. The request was sen to Meto-France for approval.Done	ok
Start BUFR distribution	AST13	CSIRO	R	There were no objections to leaving the threshold where agreed at ADMT12 so this item is finished. The threshold is 0.03 kg m−3 DONECoriolis done waiting for Mark feedback Mark doesn't see them but may be a subscription pb. Aurelie will send the header to Mark FNMOC doesn't see KMA, and NMDIS FNMOC Missing some BODC and INCOIS Mark to send the list of missing WMO to the DACS CSIRO BUFR files getting through - are all arriving? JMA files are being delivered Coriolis BUFR : UK and Germany see the Coriolis BUFR messaes. USGODAE and Meds do not see them. Ahn suggest that Coriolis uses a wrong buoy code for a float. We should IOPX01_LFVX and not IOBX01_LFVX, because IOBX01 is for drifting buoy. The request was sen to Meto-France for approval.	ok

Investigate why Coriolis BUFR are not seen	AST13	Mathieu and Mark	H	BODC - Ongoing (expected summer 2012) AOML – started (10/24/12) Coriolis done since July 4th. Real-time data older than July 4th will have an additional density test. CSIRO Kordi and Incois Done for APEX JMA Done Canada:doneDoneDONE	on going
Missing pressure levels in BUFR	AST13	CLS	H	a proposal will be sent this summer to ADMT and AST to i) reprocess all Argos locations of Argo floats since January 2008 with the Kalman filtering method ii) supply all error ellipses information for Argos locations reprocessed since January 2008 and iii) setup a new service in collaboration with the Argo Information Center to provide and archive in delayed mode of all Argos trajectory data for Argo floats.There were no objections to leaving the threshold where agreed at ADMT12 so this item is finished. The threshold is 0.03 kg m−3 Done	ok

Update the QC manual for density test	December 2011	Annie	R	a run is planned before AST13 . DACs expressed the need to have information beginning March and was OK . The next will before end of June BODC - Ongoing (expected summer 2012) AOML – started (10/24/12) Coriolis done since July 4th. Real-time data older than July 4th will have an additional density test. CSIRO Kordi and Incois Done for APEX JMA Done Canada:doneThere were no objections to leaving the threshold where agreed at ADMT12 so this item is finished. The threshold is 0.03 kg m−3	ok
Update the QC manual for density test after agreement on threshold	AST13	Annie after agremment is reacehed between DACS	R	Done Started in Dec 2011a proposal will be sent this summer to ADMT and AST to i) reprocess all Argos locations of Argo floats since January 2008 with the Kalman filtering method ii) supply all error ellipses information for Argos locations reprocessed since January 2008 and iii) setup a new service in collaboration with the Argo Information Center to provide and archive in delayed mode of all Argos trajectory data for Argo floats.BODC - Ongoing (expected summer 2012) AOML – started (10/24/12) Coriolis done since July 4th. Real-time data older than July 4th will have an additional density test. CSIRO Kordi and Incois Done for APEX JMA Done Canada:done	ok

DAC to update their density test	ADMT13	All DACs	R	BODC - Done Coriolis ok AOML – was done before JMA Done CSIRO KORDI and Incois done MEDS: no floats KMA: no floats NMDIS ?a run is planned before AST13 . DACs expressed the need to have information beginning March and was OK . The next will before end of June a proposal will be sent this summer to ADMT and AST to i) reprocess all Argos locations of Argo floats since January 2008 with the Kalman filtering method ii) supply all error ellipses information for Argos locations reprocessed since January 2008 and iii) setup a new service in collaboration with the Argo Information Center to provide and archive in delayed mode of all Argos trajectory data for Argo floats.	on going
Study on how to provide easier access to error ellipse data to DACs for new profile and history since 2008.	AST13	Yann and Mathieu, Thierry	R	Thierry working on it as Coriolis only is concerned . Done on November 8th. All profile and trajectory files have been recalculated.Done Started in Dec 2011a run is planned before AST13 . DACs expressed the need to have information beginning March and was OK . The next will before end of June	on going

Run GDAC/GTS comparison on quarterly basis.	January	Mark & Mathieu	R	OK since 07/06/2012. But previous real-time data with pressures = 2047db needs to be re-decoded.BODC - Done Coriolis ok AOML – was done before JMA Done CSIRO KORDI and Incois done MEDS: no floats KMA: no floats NMDIS ?Done Started in Dec 2011	ok
Provide monthly summary of OA anomalies to DACS and AIC.	ADMT13	Christine	R	Thierry working on it as Coriolis only is concerned . Done on November 8th. All profile and trajectory files have been recalculated.BODC - Done Coriolis ok AOML – was done before JMA Done CSIRO KORDI and Incois done MEDS: no floats KMA: no floats NMDIS ?	ok
DACs to implement the high resolution profile reduction for sending them to GTS as TESAC bulletins (description in CookBook).	ADMT13	Concerned DACs	R	A solution with a person of FNMOC, trained by A Wong , is studied and final agreement on budget is under discussion (email Steve P 02/02/2012) So far no solution has been found on 11th JuneOK since 07/06/2012. But previous real-time data with pressures = 2047db needs to be re-decoded.Thierry working on it as Coriolis only is concerned . Done on November 8th. All profile and trajectory files have been recalculated.	ok
Investigate the consistency of CNDC units and range and values .	ADMT13	Thierry and Brian	R	OK since 07/06/2012. But previous real-time data with pressures = 2047db needs to be re-decoded.	on going

Finalize recommendation for bad data flagging for Provor floats that present the 2047db anomaly.	ADMT13	Cathy	R	Coriolis : exchange with Tim (NODC) to get updates. Steve has provided zip files with data . Document not yet done but needed for AST13 . A new version was discussed between Steve and Sylvie at AST13. was finalized after AST13 Transfer between CCHDO and Coriolis happened in OctoberA solution with a person of FNMOC, trained by A Wong , is studied and final agreement on budget is under discussion (email Steve P 02/02/2012) So far no solution has been found on 11th June	on going
Delayed-Mode QC Actions					

US-Argo to investigate how to solve the Argo equivalent float DMQC issue on Navocean floats.	ADMT13	Steve P	R	RT CTDs metadata list:ftp://ftp.jcommops.org/Argo/Status/argo_ctds.txt G-Earth Web Service developed for CCHDO interoperability with http://argo.jcommops.org/argo.kml (to display argo observations upon spatial/temporal request) see http://argo.jcommops.org/cgi-bin/WebObjects/jcommops-kml.woa/wa/getObs?latMin=20&latMax=40&lonMin=-60&lonMax=-40&dateBegin=01-01-2011&dateEnd=01-04-2012&delayedMode=0Coriolis : exchange with Tim (NODC) to get updates. Steve has provided zip files with data . Document not yet done but needed for AST13 . A new version was discussed between Steve and Sylvie at AST13. was finalized after AST13 Transfer between CCHDO and Coriolis happened in October	nok
Reference Dataset Actions				Justin - Ongoing, Steve has worked on this with success in the Northwest Atlantic Justin and Megan have communicated with Steve Diggs on what geographical areas are priorities Discussion with CSIRO on priorities provided to Steve- Steve has all of CSIRO's available Southern Ocean data except the latest voyage which hasn't yet been calibrated. Paul pointed out Bad data issues he found on the reference database and was asked to provide the information to Christine for correctionCoriolis : exchange with Tim (NODC) to get updates. Steve has provided zip files with data . Document not yet done but needed for AST13 . A new version was discussed between Steve and Sylvie at AST13. was finalized after AST13 Transfer between CCHDO and Coriolis happened in October	

Put a mechanism in place to improve link between CCHDO, NODC and Coriolis to faster data provision to ref DB. Document to be provided to ADMT chairs.	AST13	Steve, Tim and Christine, thierry	H	AOML: done JMA done CSIRO Done Coriolis done BODC :Done Canada:done Incois: done RT CTDs metadata list:ftp://ftp.jcommops.org/Argo/Status/argo_ctds.txt G-Earth Web Service developed for CCHDO interoperability with http://argo.jcommops.org/argo.kml (to display argo observations upon spatial/temporal request) see http://argo.jcommops.org/cgi-bin/WebObjects/jcommops-kml.woa/wa/getObs?latMin=20&latMax=40&lonMin=-60&lonMax=-40&dateBegin=01-01-2011&dateEnd=01-04-2012&delayedMode=0Justin - Ongoing, Steve has worked on this with success in the Northwest Atlantic Justin and Megan have communicated with Steve Diggs on what geographical areas are priorities Discussion with CSIRO on priorities provided to Steve- Steve has all of CSIRO's available Southern Ocean data except the latest voyage which hasn't yet been calibrated. Paul pointed out Bad data issues he found on the reference database and was asked to provide the information to Christine for correction	ok

Work with Argo Delayed Mode Operators to identify priorities.	AST13	Steve, Megan and Justin	R	US float manufacturers visited by Argo TC (SIO-IDG, MRV, Teledyne, WHOI-IDG, SBE): - float models vocabulary checked - encouragement to use standard Argo technical names - unique data format system explained French Provor Float idem Other Floats ?RT CTDs metadata list:ftp://ftp.jcommops.org/Argo/Status/argo_ctds.txt G-Earth Web Service developed for CCHDO interoperability with http://argo.jcommops.org/argo.kml (to display argo observations upon spatial/temporal request) see http://argo.jcommops.org/cgi-bin/WebObjects/jcommops-kml.woa/wa/getObs?latMin=20&latMax=40&lonMin=-60&lonMax=-40&dateBegin=01-01-2011&dateEnd=01-04-2012&delayedMode=0	ok
CCHDO and the AIC to work on the compilation of meta data from CTD casts at float deployment locations for SEAHUNT.		Steve and Mathieu	R	DoneAOML: done JMA done CSIRO Done Coriolis done BODC :Done Canada:done Incois: done	ok
Format Actions					
Tech file DACs to update their tech file after Ann audit.	AST13	All DACs	H	Data format classification under progress thanks to JP Rannou help. reference tables to be provided for the manualDoneUS float manufacturers visited by Argo TC (SIO-IDG, MRV, Teledyne, WHOI-IDG, SBE): - float models vocabulary checked - encouragement to use standard Argo technical names - unique data format system explained French Provor Float idem Other Floats ?	on going

All DACs to check the Configuration parameters names table available at the ADMT website and check that all parameters required for their float types exist with an appropriate definition, please provide feedback to Esmee.vanWIjk@csiro.au.		Esmee and Mathieu to coordinate	R	Done Version 2,4CSIRO underway. AOML – format description almost done, scheduled forFY13 JMA underway BODC done, need USGODAE to accept new format so can submit data to GDACs. Canada done. need USGODAE to accept new format so can submit data to GDACs Coriolis : we are ready for it. Need to update some metatdata for each float (variable with multiple dimennsions).Done	on going
CSIRO to update the user manual.		Esmee with Thierry	R	In version 2.4 (30th March)Data format classification under progress thanks to JP Rannou help. reference tables to be provided for the manualCSIRO underway. AOML – format description almost done, scheduled forFY13 JMA underway BODC done, need USGODAE to accept new format so can submit data to GDACs. Canada done. need USGODAE to accept new format so can submit data to GDACs Coriolis : we are ready for it. Need to update some metatdata for each float (variable with multiple dimennsions).	ok
All DACS to implement new configuration scheme and populate the configuration parameters in the meta file. All floats must have at least one mission and the CONFIGURATION_MISSION_NUMBER parameter in the trajectory file must be populated for all cycles.		DACs	R	Coriolis done BODC on-going, done for bio floats, not done for NST floats. CSIRO coded sent to be checked by TC AOML – scheduled forFY13, submission requires 42a is completed. JMA done with new versionDone Version 2,4Data format classification under progress thanks to JP Rannou help. reference tables to be provided for the manual	on going

AIC to work with ANDRO team to set up a system linking a decoder format id to its documentation on line.	ADMT13	AIC, Esmee and Jean-Philippe	R	In version 2.4 (30th March)Done Version 2,4	on going
Document multi-axis format in user manual.	December 2011	Thierry	R	Coriolis done BODC on-going, done for bio floats, not done for NST floats. CSIRO coded sent to be checked by TC AOML – scheduled forFY13, submission requires 42a is completed. JMA done with new versionIn version 2.4 (30th March)	ok
Document CF Compliance in user manual.	December 2011	Thierry	R	will be presented at ADMT Coriolis done BODC on-going, done for bio floats, not done for NST floats. CSIRO coded sent to be checked by TC AOML – scheduled forFY13, submission requires 42a is completed. JMA done with new version	OK
DACS to implement multi-axis format to distribute their exotic floats.	ADMT13 after February 2012	Concerned DACs: Coriois, BODC, AOML,	R	*JMA: done* *Coriolis done, but delayed mode data has not been reprocessed.* *BODC done, processed new floats as per latest guidance* *AOML done,* *Canada Done* *Incois planned December 2012* *KORDI to be done in 2013* *CSIRO : done for both RT and DM* *KMA: N/A* *CSOI: ?* *NMDIS ?*	on going
Mark to enhance file checker to handle multi-axis profile	ADMT13	MARK	R	will be discussed at BIOARGO workshop at ADMT13will be presented at ADMT	nok

GDACS to manage the multiaxis files and only copy in multi-profile files the Argo Core Profile	ADMT13	Mark and Thierry	R	*JMA: done* *Coriolis done, but delayed mode data has not been reprocessed.* *BODC done, processed new floats as per latest guidance* *AOML done,* *Canada Done* *Incois planned December 2012* *KORDI to be done in 2013* *CSIRO : done for both RT and DM* *KMA: N/A* *CSOI: ?* *NMDIS ?*will be presented at ADMT	nok
Study how to add DOI in the Argo files attributes.	ADMT13	Thierry to make a recommendation	R	This has been done. The updated data manual has the new agreed upon trajectory file format which DACs can begin using as soon as it is accepted to the GDACs if they are ready. I think Coriolis may want to begin doing this as they had already begun filling in the old format. Of course, filling in some of the other new variables will be difficult without the DAC cookbook which is a separate item.will be discussed at BIOARGO workshop at ADMT13*JMA: done* *Coriolis done, but delayed mode data has not been reprocessed.* *BODC done, processed new floats as per latest guidance* *AOML done,* *Canada Done* *Incois planned December 2012* *KORDI to be done in 2013* *CSIRO : done for both RT and DM* *KMA: N/A* *CSOI: ?* *NMDIS ?*	ok

Resubmit oxygen data in format agreed at ADMT11.	AST13	CSIO, Coriolis to finish some APEX; AOML to finish some Argos floats; ISDM, INCOIS to add raw parameters	R	Donewill be discussed at BIOARGO workshop at ADMT13	on going
Validate with BIO-Argo scientists unit and Parameter name for Chlorophyll A.	ADMT13	Antoine & Thierry	R	BODC -summer 2012 JMA Done AOML – started (10/24/12). CSIRO: will be done with the rewriting of trajectory package - date unknown at this point. Coriolis started, expected on December 2012 Canada in December 2012 India: will implement from CSIRO KORDI will implement CSIRO program when readyThis has been done. The updated data manual has the new agreed upon trajectory file format which DACs can begin using as soon as it is accepted to the GDACs if they are ready. I think Coriolis may want to begin doing this as they had already begun filling in the old format. Of course, filling in some of the other new variables will be difficult without the DAC cookbook which is a separate item.	ok
Trajectory					
Update user manual to include all the changes decided at traj workshop .	January 2012	Megan	H	AOML – format description almost done, scheduled forFY13. BODC - to be done Coriolis: done since July 4th CSIRO: will be done with the rewriting of trajectory package - date unknown at this point. JMA will do it this summer	ok

				Canada done. need USGODAE to accept new format so can submit data to GDACsBODC - summer 2012 JMA Done AOML – started (10/24/12). CSIRO: will be done with the rewriting of trajectory package - date unknown at this point. Coriolis started, expected on December 2012 Canada in December 2012 India: will implement from CSIRO KORDI will implement CSIRO program when readyDone	
Document real time position QC test developed by JAMSTEC on traj files.in DC manual .	December 2011	Annie & Kanato	R	AOML: doing that already Coriolis has difficulties to implement its database. Solution : if not time is available, then in the data base time is set to cycle_start_time. When exported in NetCDF : time is set to fill_value; assign qc =9 BODC has similar PB as Coriolis CSIRO and INCOIS doing this already JMA done Canada:doneAOML: planned for FY13 (if we have the time to do it) JMA done with new version Canada:done Coriolis : done, use simple interpolation and qc = 8BODC -summer 2012 JMA Done AOML – started (10/24/12). CSIRO: will be done with the rewriting of trajectory package - date unknown at this point. Coriolis started, expected on December 2012 Canada in December 2012 India: will implement from CSIRO KORDI will implement CSIRO program when ready	ok

DACs to begin implementing real time position QC test developed by JAMSTEC on traj files. Record changes to qc flags in the history section.	AST13	DACs	R	AOML: doing that already CSIRO also doing it already Coriolis done with traj 2.3 JMA will do it this summer Canada:doneAOML – format description almost done, scheduled forFY13. BODC - to be done Coriolis: done since July 4th CSIRO: will be done with the rewriting of trajectory package - date unknown at this point. JMA will do it this summer Canada done. need USGODAE to accept new format so can submit data to GDACsAOML: planned for FY13 (if we have the time to do it) JMA done with new version Canada:done Coriolis : done, use simple interpolation and qc = 8	on going
DACs to calculate position for profiles for which no transmitted position is available following the information in the DAC cookbook.	AST13	DACs	R	AOML: doing that already,BODC - summer 2012Coriolis done CSIRO will do this as part of the traj re-programing, date unknown JMA already doing thisCanada:doneAOML: doing that already Coriolis has difficulties to implement its database. Solution : if not time is available, then in the data base time is set to cycle_start_time. When exported in NetCDF : time is set to fill_value; assign qc =9 BODC has similar PB as Coriolis CSIRO and INCOIS doing this already JMA done Canada:doneAOML – format description almost done, scheduled forFY13. BODC - to be done Coriolis: done since July 4th CSIRO: will be done with the rewriting of trajectory package - date unknown at this point. JMA will do it this summer Canada done. need USGODAE to accept new format so can submit data to GDACs	on going

DACs to implement traj2.3 format.	ADMT13	DACs	H	AOML: doing that already, BODC - summer 2012 Coriolis done CSIRO will do this as part of the traj re-programming, date unknown JMA already doing thisAOML: doing that already CSIRO also doing it already Coriolis done with traj 2.3 JMA will do it this summer Canada:doneAOML: doing that already Coriolis has difficulties to implement its database. Solution : if not time is available, then in the data base time is set to cycle_start_time. When exported in NetCDF : time is set to fill_value; assign qc =9 BODC has similar PB as Coriolis CSIRO and INCOIS doing this already JMA done Canada:done	on going
DACs to add parking PTS measurements even without times.	ADMT13	DACs	H	BODC - fix for new data ongoing for past data until summer Coriolis, AOML: we do that when we receive notifications on problem CSIRO, INCOIS: to be done Canada: To be done JMA in progress but not completed yetAOML: doing that already,BODC - summer 2012Coriolis done CSIRO will do this as part of the traj re-programing, date unknown JMA already doing thisCanada:doneAOML: doing that already CSIRO also doing it already Coriolis done with traj 2.3 JMA will do it this summer Canada:done	on going

DACs to include all cycle numbers in the N_CYCLE array. If a cycle is missing, put in a fill value for all N_CYCLE variables.	ADMT13	DACs	R	SEE action 25 for CLS and AIC proposal AOML: receiving the error ellipses on the CDROMs (DIAG files) since 10/2011 CSIRO - no progress JMA - no progressAOML: doing that already, BODC - summer 2012 Coriolis done CSIRO will do this as part of the traj re-programming, date unknown JMA already doing thisAOML: doing that already,BODC - summer 2012Coriolis done CSIRO will do this as part of the traj re-programing, date unknown JMA already doing thisCanada:done	on going
DACs to disseminate all collected Argos locations. May require reprocessing after late messages have arrived. Takes up to 3hrs for one message to get through. Can take up to two days when errors occur at CLS with a small number of positions.	ADMT13	DACs	H	see action 5BODC - fix for new data ongoing for past data until summer Coriolis, AOML: we do that when we receive notifications on problem CSIRO, INCOIS: to be done Canada: To be done JMA in progress but not completed yetAOML: doing that already, BODC - summer 2012 Coriolis done CSIRO will do this as part of the traj re-programming, date unknown JMA already doing this	on going

DACs to put in first and last message time. Remember to carefully check that first and last messages are reprocessed after more times/positions come in. If first(last) message also includes a position, include the first(last) time and then the same first(last) time with its position.	ADMT13	DACs	H	Related to action 57SEE action 25 for CLS and AIC proposal AOML: receiving the error ellipses on the CDROMs (DIAG files) since 10/2011 CSIRO - no progress JMA - no progressBODC - fix for new data ongoing for past data until summer Coriolis, AOML: we do that when we receive notifications on problem CSIRO, INCOIS: to be done Canada: To be done JMA in progress but not completed yet	on going
DACs to investigate anomalies/issues notified by ANDRO team and correct their decoders as necessary.	ASAP	DACs, ANDRO Team	H	Megan has spoken to SeaBird, MetOcean, MRV about their new floats and all have agreed (in fact, they already had most of the information being sent back) to have the appropriate cycle times reported by the float. She has not yet had any luck working with Teledyne/Webb on the APEX APF11. She is still pursuing this.see action 5SEE action 25 for CLS and AIC proposal AOML: receiving the error ellipses on the CDROMs (DIAG files) since 10/2011 CSIRO - no progress JMA - no progress	on going

Work with ATC, CLS to find a way to capture and store the axes error ellipse for all positions as soon as possible.	ASAP	ATC, Y. Bernard, DACs	R	Jean-Philippe and Megan have actually made a lot of progress on this action and JP has given me one of each of the 220 or so different float type DEP files to begin turning into traj2 files. We have a pretty stable version of the traj2 file that Megan is now beginning to produce based on the DEP files from jean-Philippe. Her goal is to have this file format worked out and as many traj2 files produced as possible by the end of the summer. This will include outside input from others interested in the trajectory2 file format, but does not depend on Brian King producing the files since Megan will be doing that. She should definitely have the 220 or so files that Jean-Philippe has given her access to already done by the end of the summer. The rest depends on whether we will get access to the rest of the files or not. That depends on whether or not Ifremer has published their results. So, this is very good progress. At least the older, corrected data, will be available soon (or as soon as we can have access to it). We can work with Thierry to find the best place to host this data set.Related to action 57see action 5	on going
DACs and float experts carefully review N_CYCLE timing table listing which floats transmit timings and which need to be estimated to ensure accuracy.	AST13	DACs, float expert, ANDRO team, M. Scanderbeg	R	Megan has spoken to SeaBird, MetOcean, MRV about their new floats and all have agreed (in fact, they already had most of the information being sent back) to have the appropriate cycle times reported by the float. She has not yet had any luck working with Teledyne/Webb on the APEX APF11. She is still pursuing this.Related to action 57	on going

Ask float expert for each type to write up procedure of how to estimate the N_CYCLE timing variables and circulate this to all the DACs via M Scanderbeg and put these specification in the cookbook.	AST13	Float expert, M. Scanderbeg	R	not progress as yetJean-Philippe and Megan have actually made a lot of progress on this action and JP has given me one of each of the 220 or so different float type DEP files to begin turning into traj2 files. We have a pretty stable version of the traj2 file that Megan is now beginning to produce based on the DEP files from jean-Philippe. Her goal is to have this file format worked out and as many traj2 files produced as possible by the end of the summer. This will include outside input from others interested in the trajectory2 file format, but does not depend on Brian King producing the files since Megan will be doing that. She should definitely have the 220 or so files that Jean-Philippe has given her access to already done by the end of the summer. The rest depends on whether we will get access to the rest of the files or not. That depends on whether or not Ifremer has published their results. So, this is very good progress. At least the older, corrected data, will be available soon (or as soon as we can have access to it). We can work with Thierry to find the best place to host this data set.Megan has spoken to SeaBird, MetOcean, MRV about their new floats and all have agreed (in fact, they already had most of the information being sent back) to have the appropriate cycle times reported by the float. She has not yet had any luck working with Teledyne/Webb on the APEX APF11. She is still pursuing this.	nok

Ask AST to contact APEX APF11 and SEABIRD METOCEAN NKE manufacturers to ask that these float cycle times be reported by the float.	AST13	AST co-chairs, M. Scanderbeg, BSH Ifremer	R	not progress as yetJean-Philippe and Megan have actually made a lot of progress on this action and JP has given me one of each of the 220 or so different float type DEP files to begin turning into traj2 files. We have a pretty stable version of the traj2 file that Megan is now beginning to produce based on the DEP files from jean-Philippe. Her goal is to have this file format worked out and as many traj2 files produced as possible by the end of the summer. This will include outside input from others interested in the trajectory2 file format, but does not depend on Brian King producing the files since Megan will be doing that. She should definitely have the 220 or so files that Jean-Philippe has given her access to already done by the end of the summer. The rest depends on whether we will get access to the rest of the files or not. That depends on whether or not Ifremer has published their results. So, this is very good progress. At least the older, corrected data, will be available soon (or as soon as we can have access to it). We can work with Thierry to find the best place to host this data set.	on going
Continue developing traj2 file format.	ADMT13	B. King, M. Scanderbeg, others interested in traj2 format	R	not progress as yet	on going
To AST: how to document the different issues that happened to the Argo data into a document for user information, e.g., pressure correction, micro-leak…	AST13	AST Chairs	R		nok

17 Annex 4 - ADMT13 Action List

PRIORITY: H: High R/ Routine L: Low

	Action	Target Date	Responsibility	Priority
	Real Time Data Stream			
1	Run the check every Quarter and sent report to DACs . AIC should be involved in the feedback and monitoring of correction as for Alt check	AST14	Anh and Mathieu	H
2	Study the timeliness of BUFR for all DACs that are much below the 90% target	ADMT14	All DACs	R
3	Each DAC to check header they are sending to GTS (bothTESAC and BUFR)– should be on Ahn's list.	December 2012	All DAcs	H
4	Anh to coordinate with Mathieu to separate floats by telecommunications methods – Argos vs Iridium to see if the delays are correlated with communications system	AST14	Anh and Mathieu	R
5	CSIO don't have any adjusted fields at GDAC. They should have some if they were applying the Surface pressure correction for APEX. To be investigating.	AST14	CSIO	H
6	The list of the anomalies detected for Adjusted parameters will be included in next anomaly report done By Coriolis	January 2013	Christine	R
7	AOML has anomaly on mixed DM and RT float that seems to be due to DM resubmission	AST14	Claudia & Elisabeth	H
8	all DACS to run the new density test on the reference profile that Thierry put on the argodatamgt www site to test there density test .	AST14	All DACs	R
9	Document the Near Surface Temperature procedure in RTQC manual	AST14	Justin/Clare/Annie	R
10	All DACs to provide feedback on Near Surface T surface procedure	ADMT14	All DACs	R

	Action	Target Date	Responsibility	Priority
11	Look at AIC report and solve the issue about coherency between AIC/ GTS /GDAC	AST14	DACs	H
12	DACs have to look at their process to check unnecessary delays and chaining processing as much as possible.	ADMT14	DACs	R
13	DACs to implement the 2047db anomaly detection described by Cecile. Document in cookbook and RTQC manual	ASAP	Coriolis, INCOIS , CSIO, JMA	R
14	Continue to progress on DOI issue	ADMT14	Justin and Thierry	R
15	Document RTQC procedure for Oxygen	AST14	Virginie and Thierry	R
	Pressure Correction			
16	Generate adjusted fields for APEX when SP=0	AST14	AOML, CSIO, NMDIS, KMA, Coriolis	H
17	DMQC rt files with all bad data so they don't contaminate the data set	ADMT14	DAC mentioned in CSIRO audit	R
18	Correct pressure for floats that don't auto-correct for surface pressure offset	AST14	AOML,BODC,CORIOLIS,MEDS, CSIO,KMA, KORDI	H
19	Correct TNPD profiles that haven't been correctly treated – simply add required comment and fields and qc values and errors	AST14	AOML,BODC,CORIOLIS,JMA,MEDS, KMA, INCOIS	H
	Reference Database			
20	A specific comparison between ICES and US-NODC to better assess the quality; including looking at slices on the deep ocean to identify potentially offset cruises and remove them.	ADMT14	Christine	R

	Action	Target Date	Responsibility	Priority
21	Inventory of cruises in Ref DB (basic ASCII file)	AST14	Christine and Steve	R
	Delayed Mode processing			
22	The list of orphan floats is in Mathieu report . DM-OPERATORS to be assigned for the remaining US equivament floats	ASAP	Steve to coordinate	R
23	DM-Operators to correct the Dfiles where anomalies we listed by John	AST14	All Dm Operators	H
24	Plan for DM workshop in 2013	déc-12	Justin and Brian	R
	GDAC			
25	KORDI and NMDIS doesn't have a GreyList and probably need update.	AST14	KORDI, NMDIS	R
26	DACS , together with the DM-Operator , should update their Greylist to remove the dead floats that have been processed in delayed mode	AST14	all DACS	H
27	Contingency Plan DACs to stop delivery to US-GDAC Notice to be sent to users on US-GDAC temporary outage US-GDAC either to turn off presence and put a Warning message or move to a mirror of coriolis gdac	Dec 2012		H
28	Action to AST and FNMOC to validate the change of mission of the US-GDAC until it's back working properly and the way to warn the users	Dec 2012	Susan and Steve	H

	Action	Target Date	Responsibility	Priority
29	US-GDAC to repair the operational operations Update GreyList File Removal operation Detailled index-File provision Accept multi-axis format Accept compressed files (.tar.gz) Provide authorization for the DACs that change their server IP address Resynchronize withFrench GDAC	AST14	Mark	H
30	GDAC to update multi-profile processing to take into account multisensor-multi axes format	January 2013	Thierry and Mark	H
31	Study if possible to populate automatically from profile file ACDD attributes	January 2013	Thierry	R
32	GDAC to study how to patch floats that only have one Cycle/Parking_Depth (add CF and extra dimension, Sampling-Schema, Mission_Number=1) as well as patch new profiles until DACc switch to V3.0 format	AST14	Thierry	R
	Format			
33	Ann to sent the anomalies of the TECH FILE Audit to DACS and DACS to correct	Dec 2012	Ann and all dacs	H
34	One contact for meta-data from each DAC to send to Esmee	Dec 2012	all DAcs	R
35	Update the meta-data format according to meeting recommendations	Dec 2012	Esmee and Mathieu	R
36	Each DAC to provide with a www page with manual online and link to their decoder	ADMT14	all DAcs	R

	Action	Target Date	Responsibility	Priority
37	Bio Argo and NST communities to check meta-data section of the manual and the configuration table and decide and advise which variables are required their floats		Catherine and Clare	R
38	Provide to AST for validation the Argo-Group definition	AST14	Esmee to AST	R
39	Modify file checker to allow that no ADJUSTED parameter is possible for the PARAM that handle the raw measurement transmitted by a float	AST14	Thierry and Mark	H
40	audit on the parameter that occurs and parameter that are declared in meta-data and profile, trajectory	ADMT14	Brian Thierry Megan Esmee	R
41	Update User Manual V3.0	Dec 2012	Thierry	H
	GADR			
42	GADR to switch to CORIOLIS GDAC to perform the monthly archive until US-GDAC is back on line	Dec 2012	Charles SUN	H
43	Check with US-NODC that the multi--profile files they distribute contain the adjusted variables when present	AST14	Charles SUN	H
	Trajectory			
44	Modify TrajV3.0 description and cookbook to take into account feedback from meeting	January 2012	John	R
45	Coriolis and Scripps to tranform Andro to Traj3.0 until 2009	June 2013	Thierry and Megan	R
46	Elaborate a proposal from CLS and Ifremer to process backlog (2009 and onwards) in TrajV3.0 for Kalman filter an processing	AST14	Yann & Virginie	R
47	DAC to process active floats TrajV3.0	June-ADMT14	all DACS	R

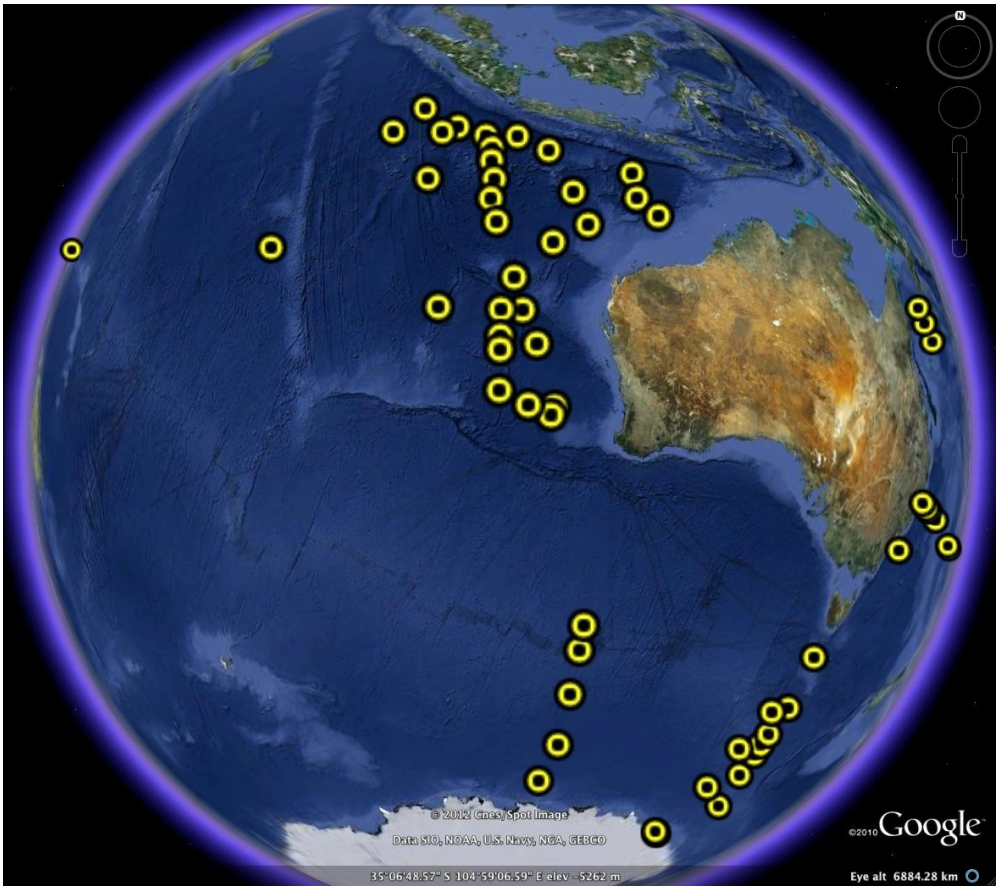
	Action	Target Date	Responsibility	Priority
	Recommendations to AST			
48	To AST: how to document the different issues that happened to the Argo data into a document for user information, e.g., pressure correction, micro-leak…	AST13	AST Chairs	R

18 Annex 5 - National Reports

Australian Argo National Data Management Report
ADMT13
Hyderabad, India – 12-16 November 2012
Ann Gronell Thresher (CSIRO)

Status of Array

Australian deployments in 2011-2012:



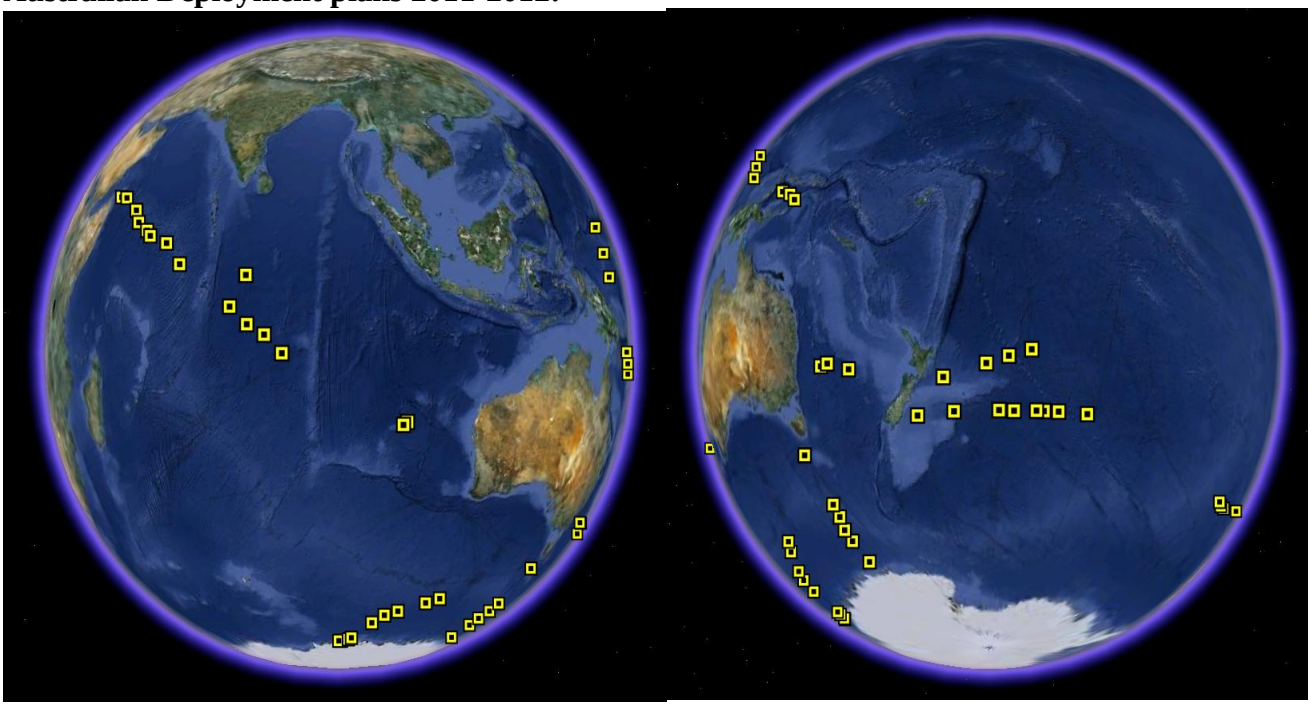
Australian Argo deployments between November 2011 and October.Yellow dots are new deployments,

Australiahas deployed 61 Argo floats since the last meeting, which is average for us.We currently have 383floats giving us good data (an increase of 48 from last year) from a total of 533 deployments. We also have 58 floats in the lab or on ships about to be deployed with another 40 on order. These purchases will help us to maintain float density in our region.

One major development this year was the requirement that we go to tender for our new floats. In the past, we have been allowed to purchase floats from a single supplier. With the advent of new float models and manufacturers, we were required to establish a tender process for float procurement. We designed this in two parts – proven technology for our day-to-day purchases and Proof of Concept (POC) for new technology. As a result of the tender process, we acquired 16 floats from 3 manufacturers. Most of these are on Kaharoa being deployed now. The remaining floats will shortly be deployed during a Southern Ocean cruise. The POC process is intended to run for approximately one year. The floats will be fully tested both in the lab before deployment and in the field, running a 5 day cycle initially to exercise the mechanics and batteries and then reprogramming them remotely to test this feature. We expect to finish our assessment before the next meeting and will report on the results to the Argo community.

Deployment plans for the floats we either have on (or about to go on) ships or on orderare shown below. We will continue to reseed the Indian Ocean and attempt to get floats into the northwestIndian Ocean when we can by working more with our Naval contacts. The Australian Navy has been very helpful, though the planning takes a long time.

Australian Deployment plans 2011-2012:



We have continued with our decision to deploy only iridium-equipped floats. The increased data density and speed of communications make this system preferable for most of our deployments and maintaining an array with uniform configurations makes testing easier. Communication costs are reasonable given the data return and they are decreasing as we move the array to RUDICS.

During the year, a float was picked up by a fisherman in PNG. Our technician is retrieving it this month. It is an older APF8 Argos version of the Teledyne Webb Apex float. We intend to reconfigure this float with an APF9 board and iridium communications before redeployment. There is another float that might be on shore in PNG as well and, if so, we will try to retrieve it if possible.

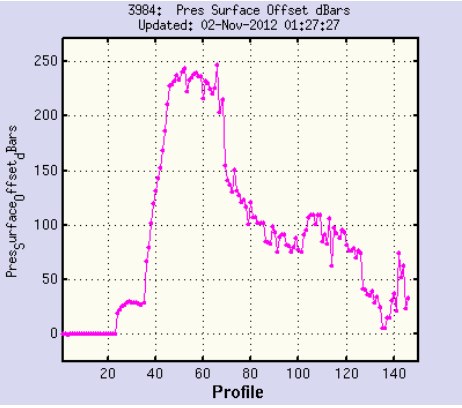
Technical Problems Encountered and Solved:
As for last year, our biggest problem this year was the apparent leaking of floats. In particular, some batches of Iridium floats seem prone to leaks, often progressing quite quickly after a period of no leaks. The Iridium array consists primarily of Webb APF9 Apex floats but we have recently acquired, as part of the POC process, 4 MRV SOLO-2 floats and 8 Seabird Navis floats (4 are equipped with the new optical dissolved oxygen sensor SBE-63). As mentioned above, these are being deployed now by Kaharoa.

Currently of the 144 iridium floats deployed, 112 are live, 18 are overdue, and 14 have been declared dead. Between 7 and 11 of the overdue floats are under ice. The cause of 'death' for these floats varied – 7 have been attributed to antenna leaks, 3 disappeared because of faulty air solenoid valves, 3 failed on deployment (unknown or possibly failed pressure activation) and 1 Iridium transmitter apparently failed.

Last year we were fortunate to recover a leaking iridium float. Upon investigation (by Teledyne Webb), it was discovered that the leak was due to weak bonding between the potting compound and the inside aluminium tubing of the antenna. The new iridium antenna design has since resolved this problem.

The added benefits of using iridium, including two way communications and real-time data delivery have been crucial in improving float survivability, mission changes and float recovery.

We have had very few issues with our Argos floats this year but one exhibited strange behavior. It shows a steadily increasing positive pressure offset so it is not a microleaker. Further, after reaching an offset of over 200db, it started to decrease again. This float is reaching the surface but reporting very strange pressure readings. We have notified the manufacturer of this issue and the float is now grey listed.



Software development:
Software development continues with the addition of new features, programming in new float formats, reprogramming of some functions and simplification of the routines.

KORDI has implemented the Australian ArgoRT software package we use and is now delivering data from its Apex floats automatically. The next step will be to give them our DMQC software and train Moon-Sik in its use. This has been a major accomplishment, second only to the implementation of this software at Incios.

If anyone else is interested in our Argo Real-time software, it is a Matlab program that works from the raw Argos hex data and iridium RUDICS delivered files (SBD is being added to the capability as well) to decode the profiles and create all required netcdf files for delivery to the GDACs. We are happy to help with getting it set up elsewhere.

Oxygen floats received an upgrade recently with the Optode calibrations now using the Uchida equation and fewer calibration coefficients. We don't intend to reprocess our older oxygen floats in real-time but all new deployments and delayed mode oxygen data will use the improved process whenever possible. We are also deploying some of the new Seabird optical oxygen sensors as part of the POC testing.

Data Acquisition and delivery to the GDACs and GTS:
Data processing has basically not changed. Raw data is processed within a maximum of 18 hours of delivery from either Argos or to us via Iridium. Argos data is processed twice – once as soon as practical, then again in 2-3 days to ensure we have the maximum number of reports and the best possible message. After passing through the real-time QC, all netcdf files are generated and the data is then sent via FTP to both GDACs. Our processing is mirrored at BOM so each file is delivered 4 times in total, ensuring that the GDACs have the data if either CSIRO or BOM are offline for some reason.Problems this year appear to have been minimal. We have, however, seen some large delays at the GDACS – this occurred particularly in August and September when we deployed 5 floats with oxygen sensors but did not yet have the calibration coefficients. The lack of these coefficients delayed processing for over 3 weeks. Further biasing the delay statistics, two of these floats are bounce-profiling up to seven (!) times a day. When you deliver 700 profiles in a month with a mean delay of over 400 hours, and don't start processing immediately, the delays add up quickly.

The data is also issued to the GTS via TESAC messages immediately.BUFR messages are now being generated and delivered to the GTS. We have confirmed that this data is being seen at the US GODAE.

InAugust 2012, the data from approximately 98% of our floats were delivered to the GTS within 24 hours of the float surface time. This is calculated from our file creation times and our float surface times so should be accurate. Yet we still see larger delays reported by the AIC. This will be investigated but we suspect it is the method of calculation, not the delays though there might still be unidentified delays at the GDAC.

Data is available for delayed mode QC as soon as the real-time data is processed but only considered valid for DMQC after 6 months. The Delayed Mode report is appended below.

Additional Data Distribution:
As noted last year, the National Collaborative Research Infrastructure Strategy (NCRIS) funds the Integrated Marine Observing System (IMOS) which is a major source of Argo funding for Australia. As part of this initiative, it is required that we have a local data delivery pathway. IMOS is now serving Argo data as a mirror to the US GDAC through its data portal which can be accessed at:

http://imos.aodn.org.au/webportal/

All IMOS data, from all nodes, can be accessed through this web site.

Float Performance:
Float performance has been excellent this year with two floats exceeding 10 years of operation. This year, only one died on deployment. And two floats we thought gone for good have returned, one after 2 years stuck on the bottom north of Papua New Guinea. Three floats have now been confirmed with the Druck microleak fault and another 10are suspected of having microleaking pressure sensors but they are in the early stages. Nine of the suspect microleakers are APF9 floats so we can monitor the progress of these – we also have one TNDP float (APF8s) that is suspect and may eventually be classed as a microleaker.

Of the 533 floats we have deployed, 131 have now been declared 'dead', an increase of 30 since last meeting. There are another 40 on the missing list but most of these are under ice. Of the dead floats, 21% ceased to operate due to natural causes when they ran down their battery packs. A further 17% died due to unknown reasons. The remainder of floats ceased to operate prematurely mainly due to environmental reasons such as grounding (20%) and loss or damage under sea ice (6%). Other contributing factors were hardware failures such as communications problems, CTD/pressure sensor damage or faults (7%); leakage (10%); software issues such as firmware bugs (5%); premature battery failure (6%) or human error (e.g. turning on the float too early resulting in buoyancy problems and subsequent loss, picked up by fisherman or deployed in the plastic bag (8%).

Web Pages:
The Australian Argo web pages are updated with the most recent data during the processing of the reports from the floats. They are therefore up to date as soon as float data is received.We have added web pages that contain details of the technical data from our floats, aiding in the diagnosis of problems. This is now done as a float is processed making them up-to-date and easy to find.

Home page for Argo Australia (IMOS)
http://imos.org.au/argo.html

The Australian data portal can be found at:
http://www.imos.org.au/facilities/argo-australia.html;

Information on individual floats can be found at:
http://www.marine.csiro.au/~gronell/ArgoRT/;

There are links to the technical pages for a float from each profile page.

Information on our DMQC process and floats can be found at:
http://www.marine.csiro.au/argo/dmqc/

Home page for DMQC documentation of floats:
http://www.cmar.csiro.au/argo/dmqc/html/Argo_DM.html
and
http://www.cmar.csiro.au/argo/dmqc/index.html

Example DMQC documentation page for a float:
http://www.cmar.csiro.au/argo/dmqc/html/DMQCnotes_5901618.html

Statistics of Argo data usage:
Argo data is downloaded to a local mirror once a week. It is then converted to a Matlab format with an index table to help local users find the data they need.

Argo usage is a difficult list to compile, as Argo data are now being used routinely by many researchers nationally and globally. Not much has changed in the past year. In addition to the information below, there are numerous publications from Australian researchers which have used Argo data and have appeared in the last year.

The data is being used with other data on the GTS to inform the Bureau of Meteorology's Seasonal Climate Outlook and is used in a dynamical climate forecast system (POAMA). As part of this the data are ingested into the BMRC Ocean Analysis (http://www.bom.gov.au/bmrc/ocean/results/climocan.htm)

- Argo data is also being used in the BLUElink ocean forecasting system.
  http://www.bom.gov.au/oceanography/forecasts/index.shtml

- We are also incorporating it as a high quality background data field for our upper ocean temperature QC programs (QuOTA archives, SOOP XBT QC).

Please see Appendix A for a list of research projects using Argo data in Australia.

Delayed Mode QC (DMQC):

Australian DM Statistics (to 21 Oct 2012)

D files submitted to GDAC	35007
Total R files	29346
R files eligible for DMQC	7205
Total eligible files for DMQC	42212

Total files at GDAC 64353

Table 1. Delayed Mode processing statistics for the Australian array.

The Australian Argo array continues to grow rapidly with 74 floats deployed over the past year (21 Oct 2011 to 21 Oct 2102). A total of 539 floats have been deployed since the beginning of the Argo program and of these, 129 floats have died and a further 22 are giving suspect data. As at 21/10/2012, 84% of eligible profiles (those that are greater than 6 months old) have been processed in delayed mode quality control.

The DMQC processing software is complete and we are now operating in maintenance mode with new floats assessed after 6 months and older floats being revisited between 1-2 times per year. Over the next 12 months we will be working on incorporating new float data formats from new float models into the data stream, new trajectory and metafile formats, incorporating multi-profile files into the DM process. We will also start to put significant effort into trajectory and oxygen data and delivery of novel Argo products. A challenge for our program is the significant increase in data volumes of our standard data in the Delayed Mode data stream as well as new QC of trajectory data and other parameters such as oxygen.

The Delayed Mode data stream is in good shape with 83% of eligible profiles (data record longer than 6 months) QC'd and available at the GDAC's. There are now more than 64,000 R and D profiles from Australian floats available at the global DACs.

A total of 437 floats have been assessed through the DMQC process for drift of the salinity sensor. Of these, 9 floats (2 %) returned no data from deployment and 9floats (2 %) returned bad data for the entire record due to pressure sensor issues or other hardware problems. Of the remaining 419 assessable floats, 377 (90 %) show no salinity drift for the life of the float. A further 34 or 8 % of floats show a positive salinity drift. A small number of floats (8) or 2 % are affected by a fresh offset or biofouling. Of the floats that are either salt or fresh offset, most were corrected using the OW salinity drift correction. 18 floats (4 %) suffered from TBTO fouling at the start of the record, generally only the first or second profiles but in some cases up to 7 profiles.

From a total of 190 APEX floats with APF 8 controller boards and Druck pressure sensors, 58 (26%) were truncated negative pressure drifting (TNPD). Three floats have been confirmed as Druckmicroleakers (5901649, 5901689, 5901660); two of these were APF9's and one TNPD APF8. Float 5901704 identifed as a DML last year has now been confirmed as a non DML (this float is thought to have had data issues caused by grounding). The Druck pressure sensor serial numbers on all 3 confirmed DML floats are greater than 2324175. Two of these floats showed rapid gross pressure drift (-10 db within 18 and 23 cycles for the two APF9 floats respectively) and severely anomalous TS data within 20 to 30 cycles. The third float is an APF8 float that truncates negative pressure drift and hence the only indication is anomalous TS data from profile 65 onwards. A further 10 floats are suspected microleakers (9 of these are APF9 so we can track the pressure drift) and are exhibiting negative pressure drifts of between 3 and 6 db after around 100-150 cycles. The APF8 float has been greylisted from pf 74 onwards for showing anomalous TS data.

The Argo Australia web pages are continuously updated and are available at the following website: http://imos.org.au/argo.html
There is a Delayed Mode webpage for every float that has undergone DMQC (including detailed plots and diagnostic information), these are available at:
http://www.cmar.csiro.au/argo/dmqc/html/Argo_DM.html

Appendix A.

The following table shows some of the uses to which Argo data is put within Australia.

Project Title	Institution	Principal Investigators
Australian Climate Change Science Program: Ocean Processes and Change	Department of Climate Change and Energy Efficiency, Commonwealth Scientific Industrial Research Organisation	Steve Rintoul, Susan Wijffels, Bernadette Sloyan
Australian Climate Change Science Program: Sea Level Rise	Department of Climate Change and Energy Efficiency, Commonwealth Scientific Industrial Research Organisation	John Church, Susan Wijffels
Climate Variability and Change Program	Centre for Australian Weather and Climate Research , Antarctic Climate and Ecosystems Cooperative Research Centre	Steve Rintoul
Sea Level Rise Program	Centre for Australian Weather and Climate Research , Antarctic Climate and Ecosystems Cooperative Research Centre	John Church
Ocean Control of Carbon Dioxide Oceans Change Program	Antarctic Climate and Ecosystems Cooperative Research Centre	Tom Trull
Pacific Climate Change Science Program; Oceans Component - Ocean change, variability and sea level rise	Department of Climate Change and Energy Efficiency, Commonwealth Scientific Industrial Research Organisation, Centre for Australian Weather and Climate Research , University of New South Wales	John Church, Susan Wijffels, Jaci Brown, Alexander Gupta, Partner Institution(s): Pacific Island Countries
POAMA development: improving seasonal climate forecasting for Australia	Bureau of Meteorology	Oscar Alves, Harry Hendon
WAMSI Node 1: Southwest Australia marine ecosystem	Commonwealth Scientific Industrial Research Organisation, University of Western Australia	John Keesing, Ming Feng, D Slawinski
WAMSI Node 2: Leeuwin Current dynamics and variability	Commonwealth Scientific Industrial Research Organisation, University of Western Australia	Ming Feng, Dirk Slawinski, LiejunZhong,
Modeling of source-sink relation of western rock lobster recruitment	Fisheries Research & Development Corporation	N Caputi, Ming Feng, E Weller
BlueLink II/III - ocean forecasting for Australia - Bluelink Global Program (OFAM, BRAN,	Centre for Australian Weather and Climate Research , Bureau of Meteorology	Helen Beggs, G Brassington, D Griffin, P Oke, Eric Schulz, 2003-2013, Partner Institution(s): Royal Australian

OceanMaps) - Bluelink Regional Program (ROAM, CLAM) - Bluelink Littoral Zone Program The global and regional components use Argo explicitly. These components of Bluelink use IMOS data in different ways.		Navy
Research program: Mechanisms and attribution of past and future ocean circulation change	ARC Centre of Excellence for Climate System Science	Professor Nathaniel Bindoff (University of Tasmania);Dr Andrew Hogg (ANU);Professor Matthew England (UNSW);Dr DietmarDommenget (Monash University);Professor David Karoly (University of Melbourne);Dr Peter Strutton (University of Tasmania);Dr Richard Matear (CAWCR-CSIRO);Dr Anthony Hirst (CAWCR-CSIRO);Dr Scott Power (CAWCR-BoM);Dr Stephen Griffies (Geophysical Fluid Dynamics Laboratory, USA)
ARC Future Fellowship: Southern Ocean productivity and CO2 exchange under current and future climate regimes.	University of Tasmania	Peter Strutton
Environmental factors affecting the low puerulus settlements	FRDC	Caputi and Feng,
Mixing parameters in the Southern Ocean determined by inverse methods	Commonwealth Scientific Industrial Research	Andrew Meijers OCE Postdoc, co-supervised by Trevor McDougall and Bernadette Sloyan
Quantifying the role of salps in marine food webs and organic carbon export	University of New South Wales, Funding: ARC Discovery Project	,IainSuthers
Coastal cold core eddies of the East Australian Current and their fisheries potential	University of New South Wales, Funding: ARC Discovery Project	Iain Suthers
Eddies and Upwelling: using satellite datasets to examine patterns in chlorophyll a adjacent to the East Australian Current	University of Technology Sydney	Jason Everett

Postgraduate research projects using Argo data

Degree Type	Degree Title	Student	Institution
Doctor of Philosophy (Phd)	Ocean Salinities and Changes to the Hydrological Cycle	D Abecasis	University of Tasmania, Commonwealth Scientific Industrial Research Organisation
Doctor of Philosophy (Phd)	Decadal Variability in the Indo-Pacific	Mauro Vargas	University of Tasmania, Commonwealth Scientific Industrial Research Organisation
Doctor of Philosophy (Phd)	Southern Ocean Overturning	Amelie Meyer	University of Tasmania, Commonwealth Scientific Industrial Research Organisation
Doctor of Philosophy (Phd)	Intraseasonal Variability in the Indian Ocean	K Drushka	Scripps Institution of Oceanography, Commonwealth Scientific Industrial Research Organisation
PhD	Phytoplankton Variability in the Southern Ocean South of Australia	Robert Johnson	UTas
Doctor of Philosophy (Phd)	An Operational Circulation Forecast System for Jervis Bay, NSW	Donghui Jiang	ADFA
Doctor of Philosophy (Phd)	Evaluating the Potential Economic Benefits from Regional Ocean Observing System to the Australian East Coastal Areas	Fan Zhang	ADFA
Doctor of Philosophy (PhD)	Predicting the Ocean Mesoscale Dynamics in the Australian Region	R. Woodham	UNSW at ADFA
Doctor of Philosophy (PhD)	Modelling Dynamics of the East Australian Current and The Subtropical Mode Water off East Coast of Australia	Vihang Bhatt	UNSW at ADFA
Doctor of Philosophy (Phd)	Numerical modelling of Tasman Sea eddy field	Helen Macdonald	UNSW
Doctor of Philosophy (Phd)	Argo data in the Coral Sea...	Jasmine Jaffres	JCU
Doctor of Philosophy (Phd)	The Kinematics of Ocean Salinity Changes	Veronique Lago	QMS at UTas
Doctor of Philosophy (Phd)	Ocean circulation and mixing from inverse	SjoerdGroeskamp	UTas, CSIRO

	methods		
Doctor of Philosophy (Phd)	Variability of Sub-Antarctic Mode Water and Antarctic Intermediate Water in the Australian sector of the Southern Ocean	Laura Herraiz-Borreguero	UTas
Doctor of Philosophy (Phd)	Quantifying ocean mixing from hydrographic data	Jan Zika	UNSW, CSIRO
Doctor of Philosophy (Phd)	Decadal ocean water mass changes: Global observations and interpretation	Kieran Helm	UTas
Doctor of Philosophy (Phd)	Global Ocean Salinity: A climate change diagnostic?	Paul Durack	UTas

Argo Canada National Data Management Report

ADMT13

Nov 12- 16, 2012

1. Status

Data acquired from floats: We are currently tracking 127 floats. Of these, 36 might be in trouble or might have failed to report within 6 months. In 2012, we deployed 12 floats from METOCEAN which report on Iridium satellite. Currently, we acquired Argo messages from Argos (through CLS) and Iridium (SBD through Joubeh, Rudics through CLS).

Data issued to GTS: All of data is issued to the GTS in TESAC and BUFR format. On average, 75% and 57% of data issued on the GTS within 24 hours in TESAC and BUFR between September 2011 to September 2012, respectively. For this period, the timeliness decreases compared to other year due to the delays and problems in the development of new decoders for new METOCEAN floats.

Data issued to GDACs after real-time QC: All of the profile, technical, trajectory and meta files are transmitted to GDACs in netCDF format on an operational basis with some delay compared to the data sent on the GTS, because the two processes run on two different servers and the conversion process to netCDF takes a long time. After some program modifications and optimization, now the time delay is reduced to 2 hours between the GTS data and the data sent to GDACs.

Data issued for delayed QC: Data are available for delayed mode QC as soon as they are sent to the GDACs but only considered valid for DMQC after 6 months.

Delayed data sent to GDACs: A total of about 4855 eligible files from 19 floats were quality-controlled or re-quality controlled for salinity (following OW software) and pressure (delayed mode method according to the manual) and sent to the GDAC since October 2011.

Web pages:

http://isdm.gc.ca/isdm-gdsi/argo/index-eng.html

We maintain pages that show float tracks and all data collected by Canadian floats. Links for both real-time and delayed mode data are also available for download are directly from GDAC. The pages are updated daily.

We also show some information about the global programme including the position of floats over the previous months, the success rate of meeting the 24 hours target for getting data to the GTS at

various GTS insertion points, the number of messages transmitted, reports of floats which distributed more than one TESAC within 18 hours and Canadian float performance statistics.

Statistics of Argo data usage: We currently have three PIs. Argo data have been used to generate monthly maps and anomaly maps of temperature and salinity along line P in the Gulf of Alaska. Line P has been sampled for 50 years and has a reliable monthly climatology. For more information on the Line-P products and other uses of Argo to monitor the N.E. Pacific go to:

http://www.pac.dfo-mpo.gc.ca/science/oceans/Argo/Alaska-Argo-eng.htm

2. Delayed Mode QC

As of October 2012, 20% of all eligible floats, active and inactive, had their profiles QCed visually and adjusted for pressure and salinity according to latest delayed-mode procedures. The salinity component of DMQC had been performed on 65% of eligible cycles. The following challenges or actions prevented the processing of more cycles and floats: migration of servers which run the software and contain the large climatological and profile files and visually inspecting every cycle from inactive floats who were never inspected or whose reviewed RAW flags had not been updated when they were visually inspected (pre 2009) and competing reprocessing actions triggered by the objective analysis and pressure correction audits.

The 61 profiles from 10 floats that had been identified as suspicious by the Coriolis Objective Analyses from November 2011 to June 2012 have been corrected. There are however currently 15 profiles from 7 floats which have been identified by the Coriolis Objective Analysis since July 2012 which have not been processed.

The problems revealed by Jeff Dunn's pressure correction audit on the global archive on 25 Nov 2011 have been fixed.

3. GDAC functions

Canada forwards TESAC data to the GDAC in Brest and NODC three times a week.

4. Region Centre Functions

Canada has no regional centre function.

Chinese Argo National Data Management Report

ADMT-13, India

1. Status

From November 2011 to October 2012, China received data from 78 floats. Of these floats, 14 are PROVOR floats, 17 are Iridium APEX floats (including two floats installed O2 sensor), 8 are Arvor floats and the remaining are standard APEX floats (including two O2 floats). These floats were mainly deployed by two PIs from the Second Institute of Oceanography (CSIO) and East China Sea Branch, SOA. 2887 R-files have been submitted into GDAC after RT QC within 24-48 hours. Of them, messages from 8 Arvor floats were decoded by Coriolis DAC, and the others are respectively decoded by NMDIS and CSIO. All data was into GTS by CLS.

In this February, China submitted 1003 D-files into GDAC. The total number of D-files is up to 5879, which accounts for about 70% of the submitted profiles.

China provides access to the global Argo profiles data, meta data, trajectory data and deployment information from the daily updated Argo Database. The users are able to access to the data conveniently on the website including netCDF raw data, near real-time data, meta data, trajectory data, delayed-mode data and download Argo data via FTP.

In order to expand the usage of Argo data, China has set up an Argo trajectory data quality control system, which can eliminate abnormal location data. Based on J.J. Parker method, China also provides the global monthly averaged surface current and mid depth current maps derived from good Argo trajectory data, which can be download from (http://www.argo.gov.cn)

In 2012, a global TS gridded product are developed(horizontal resolution: $1^o \times 1^o$; period: January 2004-December 2011; vertical resolution: 48 levels) based on Argo data. The product was based on Cressman successive correction method and could be access from ftp://122.224.173.41/pub/ARGO/BOA_Global/ .

Besides these, many products of Argo data, such as waterfall maps, Argo trajectory maps are also provided. All products and China Argo Project related information are distributed on the websites: http://www.argo.gov.cn and http://www.argo.org.cn. Global Argo data can be downloaded from ftp sites ftp.argo.gov.cn and ftp.argo.org.cn/pub/ARGO/global/.

Argo data have been widely used in scientific applications (e.g. ocean water masses, circulation, upper ocean responses to TCs and validation of satellite retrieved SST) and operational models. Some institutes who are using Argo data in their ocean model or data reanalysis system are listed as below:

(1) NMDIS: a 23-year regional reanalysis product (CORA) of TS and currents for the China coastal waters and adjacent seas.

(2) Institute of Atmospheric Physics, CAS: ocean data reanalysis system for the joint area of Asia and Indian-Pacific ocean.

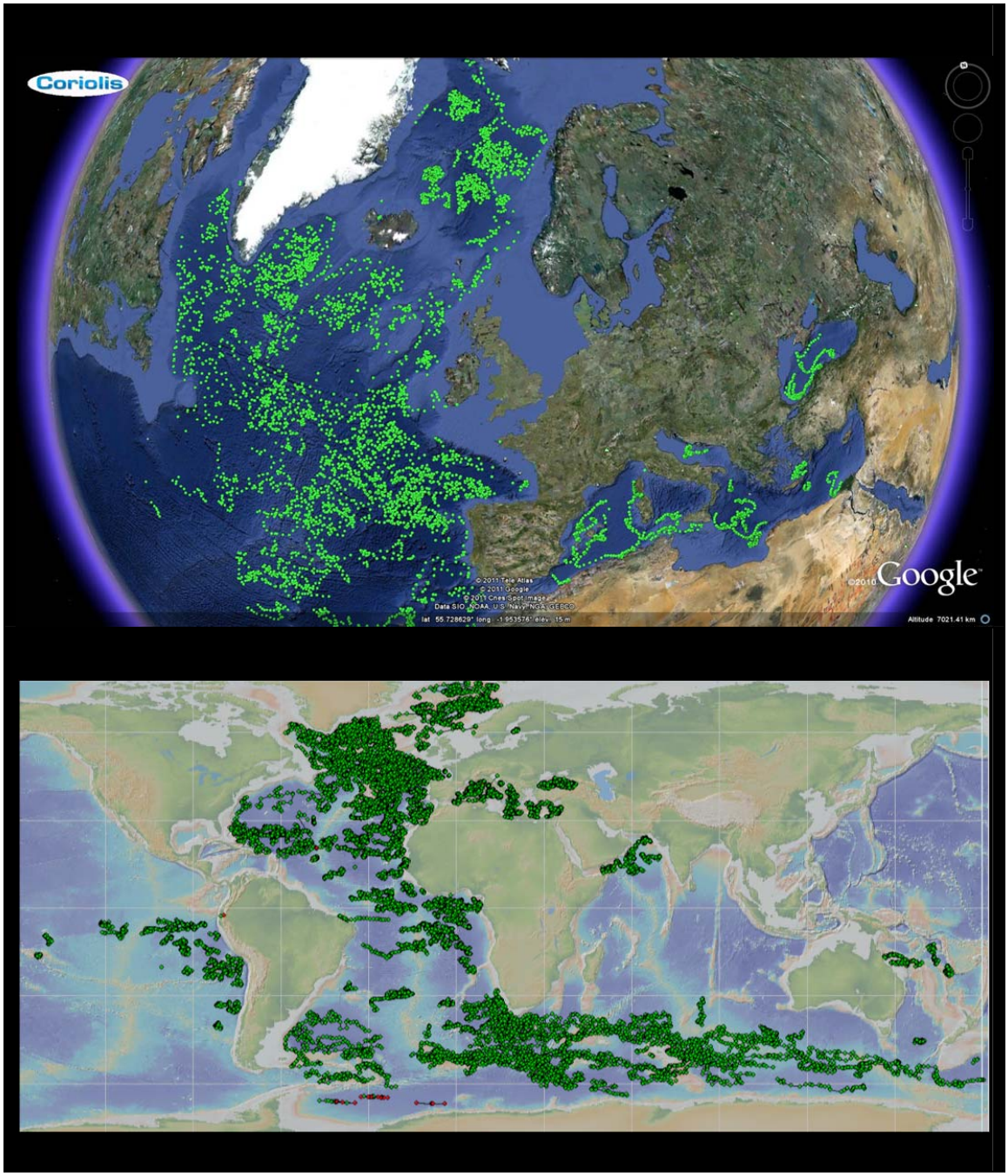
2. Delayed Mode QC

The surface pressure, CTM and OW salinity correction have been applied in our DMQC. D-files for 27 TNPD APEX floats have also been corrected. The progress of DMQC was delayed this year, mainly due to lack of manpower. Some of the floats have not been implemented DMQC because they drifted into the Kuroshio where there existed a large variability of water salinity.

Argo data management report 2012

Coriolis DAC & GDAC

Data Assembly Centre and Global Data Assembly Centre
Annual report September 2011 - October 2012
Version 1.1
November 8th, 2012



Status

(Please report the progress made towards completing the following tasks and if not yet complete, estimate when you expect them to be complete)

- Data acquired from floats
- Data issued to GTS
- Data issued to GDACs after real-time QC
- Data issued for delayed QC
- Delayed data sent to GDACs
- Web pages
- Statistics of Argo data usage (operational models, scientific applications, number of National PIs…)
- Products generated from Argo data …

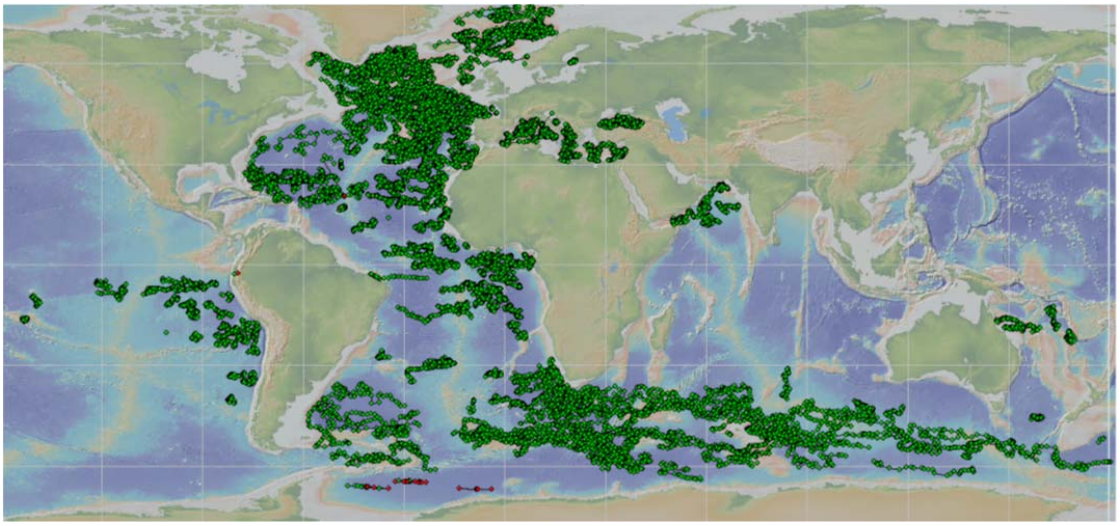
This report covers the activity of Coriolis data centre for a one year period from September 1st 2011 to September 30th 2012.

Data acquired from floats

These last 12 months[1], a total of 18 841 profiles from 1390 floats was collected, controlled and distributed.

The 1390 floats managed during that period had 37 versions of data format:

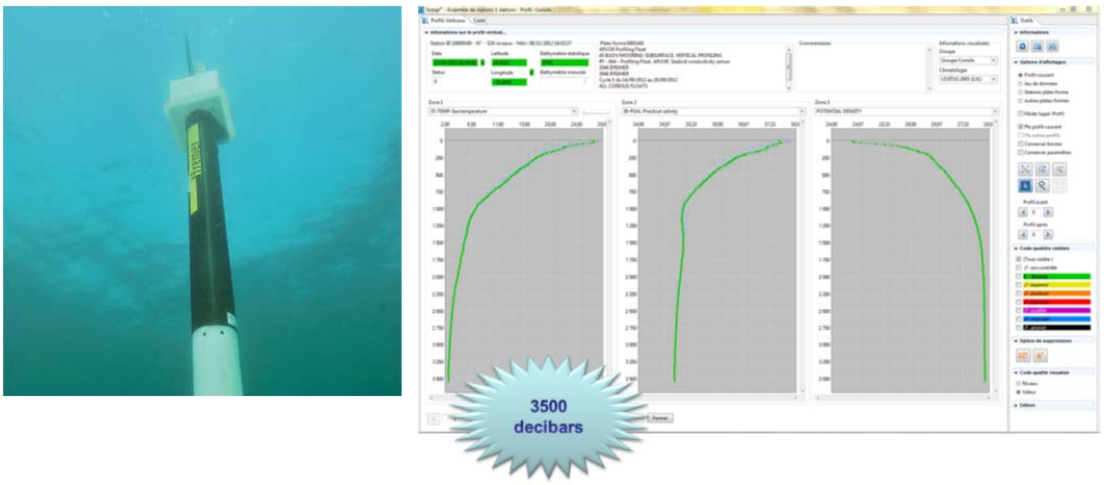
- APEX: 22 versions
- NEMO: 1 version
- NOVA: 1 version
- PROVOR-Arvor: 13 versions



Map of the 18 841 profiles from 1390 floats managed by Coriolis DAC this current year

[1] From September 2011 to October 2012

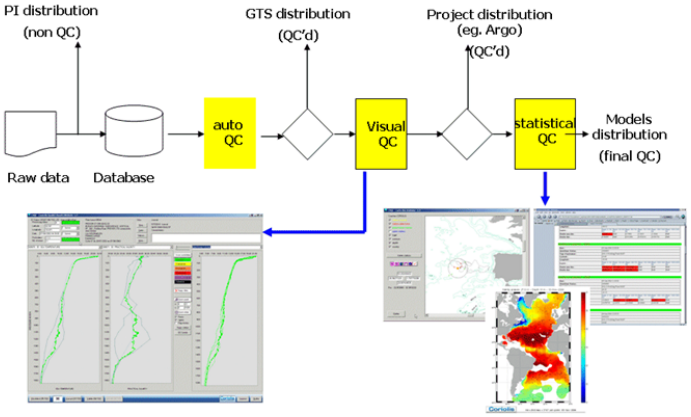
In October 2012, the first profiles from the deep ocean profiler Arvor 3500 were decoded by Coriolis data centre. The 3500 decibars temperature and salinity profiles where transmitted from mid-Atlantic through Iridium SBD transmission.



Arvor 3500: going deeper in ocean.

Data issued to GTS

All profiles processed by Coriolis are distributed on the GTS by way of Meteo-France. This operation is automatically performed. After applying the automatic Argo QC procedure, the Argo profiles are inserted on the GTS every 2 hours. Argo profiles are inserted on the GTS 365 days per year, 24 hours a day.



CORIOLIS DAC: Argo data flow

Data issued to GDACs after real-time QC

All meta-data, profiles, trajectory and technical data files are sent to Coriolis and US-GODAE GDACs. This distribution is automated.

Since August 7th 2012, Coriolis files are distributed in the Argo new format versions (profiles and trajectory version 2.3; metadata and technical data version 2.4), unfortunately, these files are rejected by the US-GODAE server file format checker.

The provision of data in the new format was dictated by a model change in the internal Coriolis database. This change was not related to Argo data-management. But, after the model change, only new Argo formats could be generated.

Data issued for delayed QC

All profile files are sent to PIs for delayed QC. Most of the Atlantic data handled by Coriolis are checked by the European project Euro-Argo.

Delayed mode data sent to GDACs

An Argo delayed mode profile contains a calibrated salinity profile (psal_adjusted parameter).

A total of 9 193 new delayed mode profiles where sent to GDACs this year.

The number of delayed mode profiles increased by 11%.

A total of 91 402 delayed profiles where sent to GDACs since 2005.

Web pages

The web site of the French DAC is available at:

- http://www.coriolis.eu.org/Observing-the-ocean/Observing-system-networks/Argo

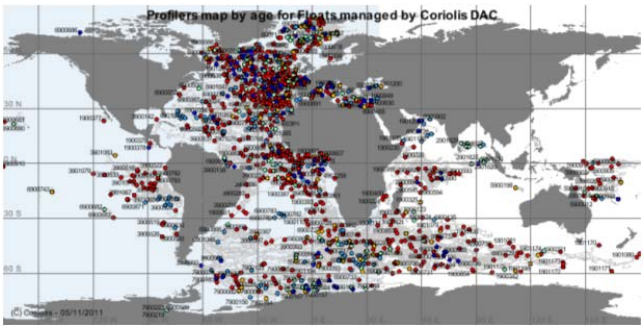
It provides:

- Individual float description and status (meta-data, geographic map, graphics : section, overlaid, waterfall, t/s charts)
- Individual float data (profiles, trajectories)
- FTP access
- Data selection tool
- Global geographic maps, GoogleEarth maps
- Weekly North Atlantic analyses (combines Argo data and other measurements from xbt, ctd, moorings, buoys)

Some pages of Coriolis web site are dedicated to technical monitoring:

- http://www.coriolis.eu.org/Observing-the-ocean/Observing-system-networks/Argo/Support-to-Data-Mgt/At-sea-monitoring

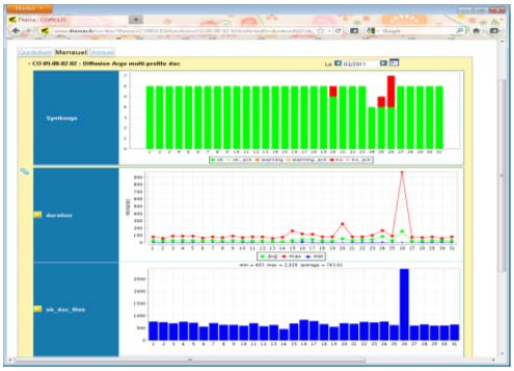
Example 1: technical monitoring of Argo-France floats



Example 2: age map of floats managed by Coriolis DAC.

Data centre activity monitoring: Coriolis operators perform an activity monitoring with an online control board.

Example 1: distribution activity on 03/11/2011. An operator has to perform a diagnostic on anomalies of Argo data distribution (red smileys). A series of small data base incidents explains the unusual situation.



Example 2: data distribution to GDAC activity in March 2011. On 26th, a bigger than usual data distribution delayed the update of DAC files.

Statistics of Argo data usage (operational models, scientific applications, number of National Pis…)

Operational oceanography models; all floats data are distributed to:

- French model Mercator (global operational model)
- French model Previmer (regional operational)
- French model Soap (navy operational model)
- EU MyOcean models (Foam, Topaz, Moon, Noos)
- EuroGoos projects

Argo projects: this year, Coriolis data centre performed float data management for 34 Argo scientific projects and 48 PIs (Principal Investigators).

List of Principal Investigators in 2012	
Alain SERPETTE	Holger GIESE
Alban LAZAR	Isabelle TAUPIER-LEPAGE
Andreas STERL	Jens SCHIMANSKI
Andreas Sterl	Jose Luis PELEGRI
Antoine POTEAU	Juergen FISCHER
Bernard BOURLES	Juliet HERMES
Bert RUDELS	K.-P. Koltermann
Bert Rudels	Kjell Arne MORK
Birgit Klein	Louis PRIEUR
BOURLES Bernard	Olaf KLATT
C. PROVOST et N. BARRE	PASCUAL Ananda
Cecile CABANES	Pierre Marie POULAIN
Christine COATANOAN	Rena CZESCHEL
Christophe MAES	Sabrina SPEICH
Detlef QUADFASEL	Sabrina SPEICH et Michel ARHAN
Dr Osvaldo ULLOA	Serge LE RESTE
Einar SVENDSEN	Stephane BLAIN
Fabien ROQUET	Sunke Schmidtko
FONT Jordi	VELEZ BELCHI Pedro Joaquin
Frederic VIVIER	Violeta SLABAKOVA
Gerard ELDIN	Virginie THIERRY
Gerasimos KORRES	Xavier ANDRE
Gilles REVERDIN	Xavier CARTON
Gregorio PARRILLA	Yves GOURIOU

List of scientific projects active in 2012	
ARGO SPAIN	FLOPS
ARGO_AWI	GOODHOPE
ARGO_BUL	IFM
ARGO_CHILE	IFM-GEOMAR
ARGO_FIN	IFM2
ARGO_NORWA	MEDARGO
ARGO_SPAIN	MEDARGO_IT
ASA	MFSTEP
BIOArgo	OVIDE
BSH	PROSAT
CONGAS	SHOM
CORIOLIS	TRACK
CORIOLIS_OVIDE	TRACK2010
DAP	WEN
EGYPT	

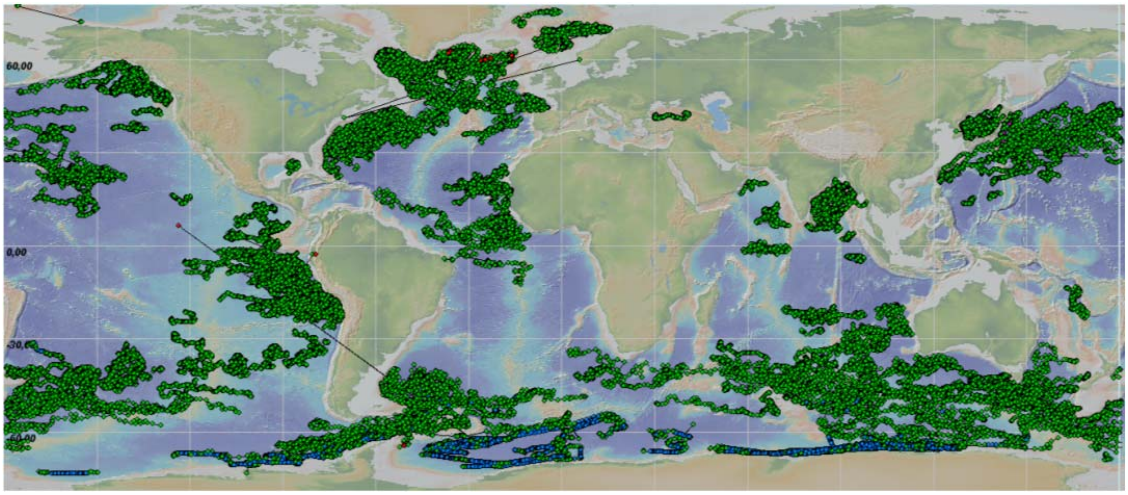
Products generated from Argo data …

Distribution of Argo oxygen observations to EU former CarboOcean project.

Once a week, all Argo floats data with oxygen observations are distributed to the German data centre Pangea using the OAI inter-operability protocol (Open Archive Initiative).

This year, 9 086 new oxygen profiles from 240 floats were distributed.

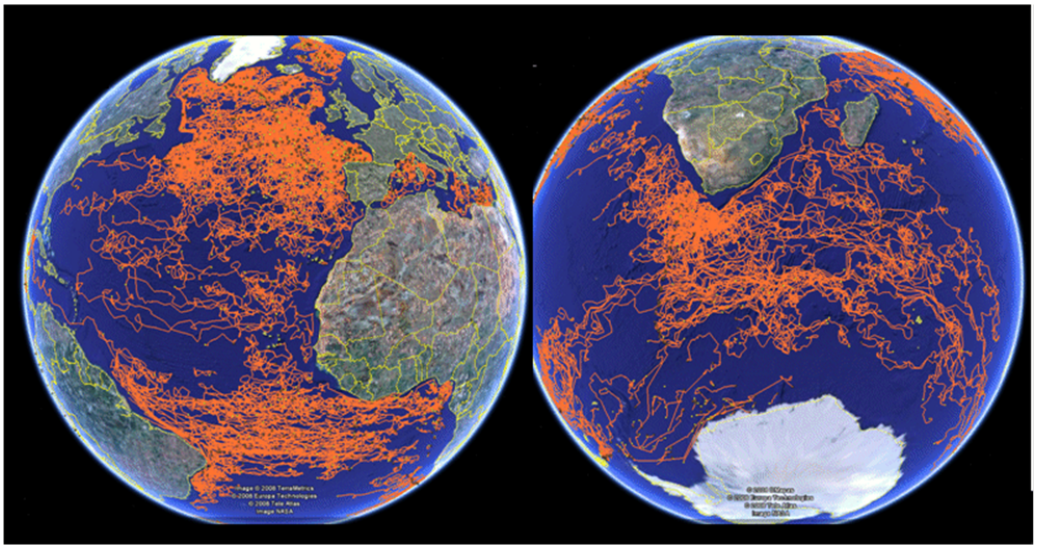
A total of 57 429 oxygen profiles from 459 floats were distributed since 2004.



Oxygen profiles collected by all Argo partners since 2004.

Sub-surface currents Atlas

Based on Argo trajectory data, Michel Ollitrault and the Ifremer team are continuously improving the “Andro” atlas of deep ocean currents.



Argo trajectories from Coriolis DAC are carefully scrutinized to produce the “Andro” atlas of deep ocean currents.

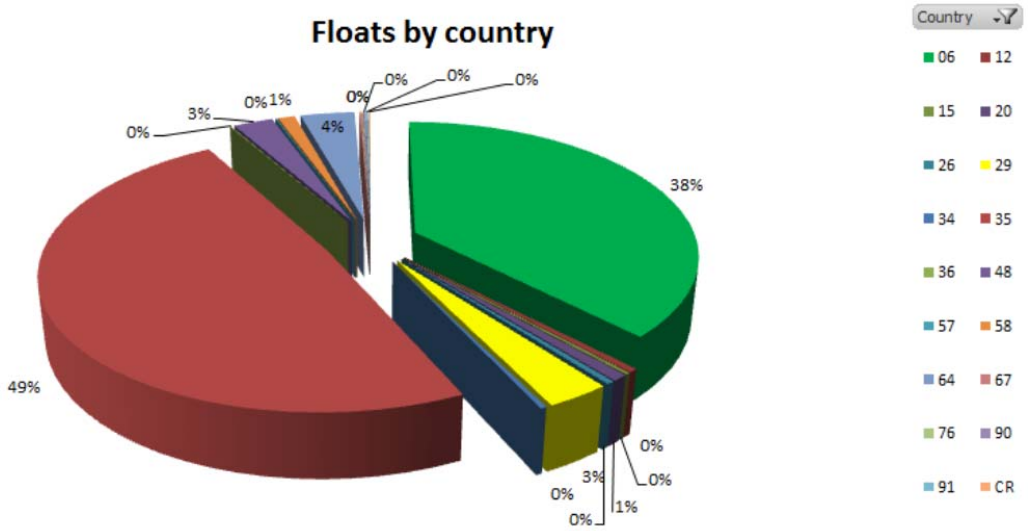
Delayed Mode QC

(Please report on the progress made towards providing delayed mode Argo data, how it's organized and the difficulties encountered and estimate when you expect to be pre-operational).

At the Coriolis data centre, we process the delayed mode quality control following four steps. Before running the OW method, we check carefully the metadata files, the pressure offset, the quality control done in real time and we compare with neighbor profiles to check if a drift or offset could be easily detected. As last year, we have worked on this way with PIs to strengthen the delayed mode quality control.

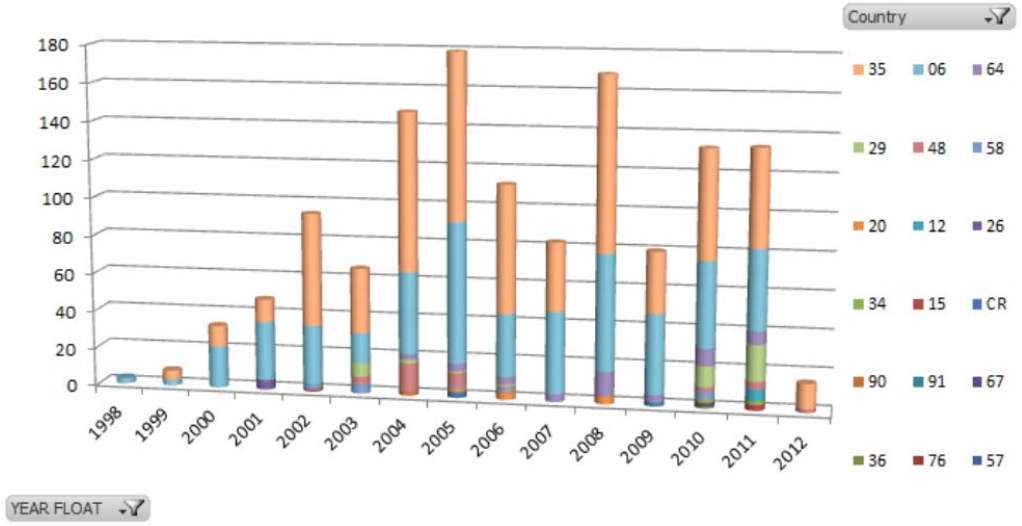
Some floats have been deployed from some projects, meaning a lot of PIs and a lot of time for explaining the DM procedure to all of them. A few PIs are totally able to work on DMQC following the four steps but this is not the case for most of them. Since the unavailability of the PIs leads to work by intermittence and then extend the period of work on the floats, we did the work with a private organism (Glazeo) to improve the realization of the DMQC, exchanging only with the PIs to validate results and discuss about physical oceanography in studied area. Working in this way, we have largely improved the amount of delayed mode profiles.

For a few projects, there are still no identified operators to do DMQC, for instance the first run has been done by students which have now left institutes or are not available to carry on with this work. For floats which are German floats (AWI), we found a new operator to run the DMQC. Nevertheless we have made progress with BSH (Marek Stawarz) and some floats have been processed in DMQC or are in progress (we are finalizing delayed mode QC for some floats). Only a few projects are still waiting for PI's answers.



Percentage of floats by country in the Coriolis DAC.

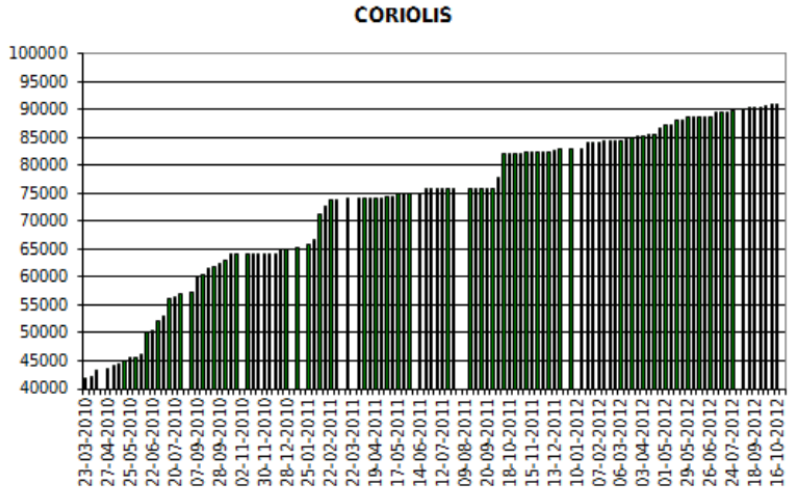
Codes for the countries: 06 : Germany - 15 : Bulgaria - 20 : Chili – 26 : Denmark – 29 : Spain – 34 : Finland - 35 : France – 36 : Greece - 48 : Italy – 57 : Mexico - 58 : Norway – 64 : Netherlands – 90 : Russia – CR : Costa Rica



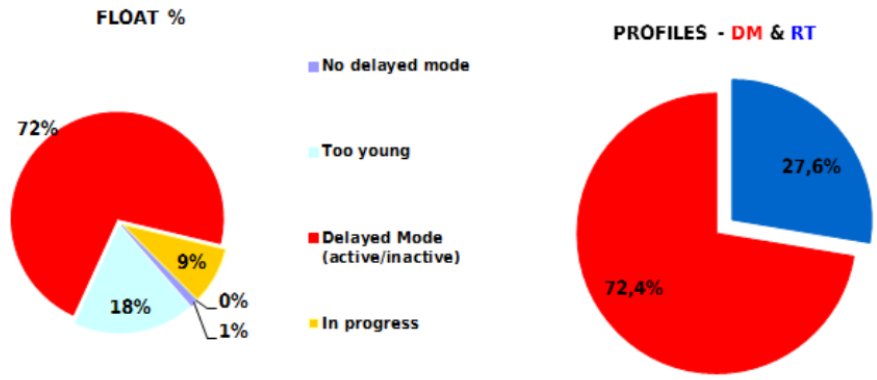
Percentage of floats by country and by launch's year in the Coriolis DAC

Concerning the APEX floats, some progresses have been done to correct the surface pressure. Most of the APEX belongs to Germany; a lot of those German floats have been corrected by BSH. Some of the French APEX floats still need to be review in the decoding step and are in the grey list.

During the last year, 8671 new delayed mode profiles where produced and validated by PIs. A total of 90784 delayed mode profiles where produced and validated since 2005.



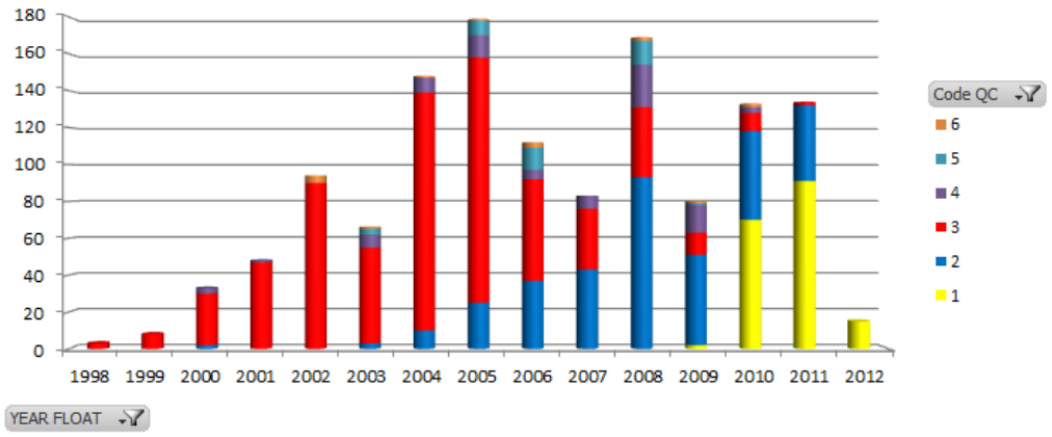
Evolution of the DM profiles' submission versus dates



Status of the floats processed by Coriolis DAC.

Left: in terms of float percent and right: in terms of profile percent (DM : delayed mode – RT : real time).

The status of the quality control done on the Coriolis floats is presented in the following plot. For the two last years (2011-2012), most of the floats are still too young (code 1) to be performed in delayed mode. For the year 2010, we are working on the DMQC of those floats, which should be available for the end of this year. The codes 2 and 3 show the delayed mode profiles for respectively active and dead floats.

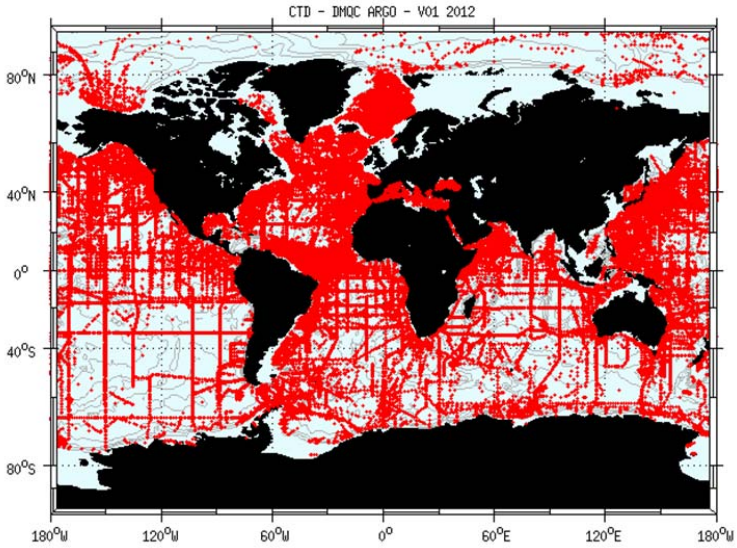


Status of the quality control done on profiles sorted by launch's year, code 1: young float, code 2: active float, DM done, code 3 : dead float, DM done; code 4 : DM in progress, code 5 : waiting for DM, code 6 : problems with float.

Reference database

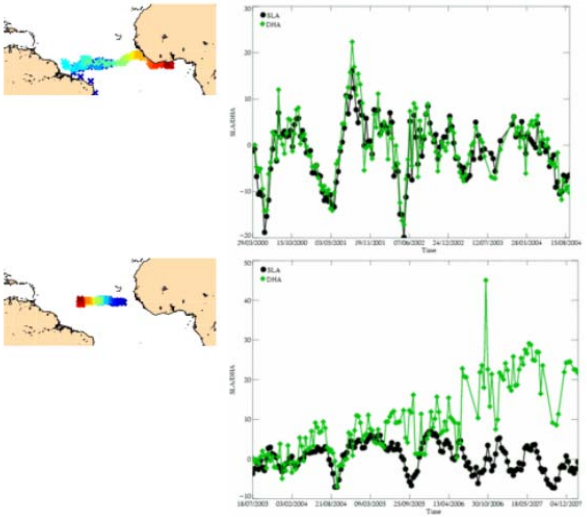
The version CTD_for_DMQC_2012V01 is available since March 2012. A new version CTD_for_DMQC_2012V02 should be on line in November 2012.

The March's version takes into account updates from NODC as well as feedbacks from users about duplicate or invalid pair, and bug in position of some stations in not appropriate boxes. The next version will be available for November 2012, some new CTD provided by the updates of WOD2009 and by the CCHDO will be integrated as well as CTD dataset from ICES. This version will be provided in smaller tar balls, one by wmo box area (1-3-5-7): for instance, CTD_for_DMQC_2012V02_1.tar.gz for all boxes starting with wmo 1, then we will have 4 tar files.



Example of delayed mode activity

A comparison between Argo float observations with SLA and DHA (SLA, Sea Level Anomalies; DHA, Dynamic Height Anomalies) is performed on a routine mode, 4 times a year.



GDAC Functions

(If your centre operates a GDAC, report the progress made on the following tasks and if not yet complete, estimate when you expect them to be complete)

- National centres reporting to you
- Operations of the ftp server
- Operations of the www server
- Data synchronization
- Statistics of Argo data usage : Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …

National centres reporting to you

Currently, 11 national DACs submit regularly data to the French GDAC.

The additional GTS DAC contains all the vertical profiles from floats that are not managed by a national DAC. These data come from GTS and GTSPP projects. The GTS profiles are quality controlled by the French DAC (Coriolis).

On November 5th, the following files were available from the GDAC FTP site.

DAC	metadata files	increase from last year	profile files	increase from last year	delayed mode profile file	increase from last year	trajectory files	increase from last year
AOML	4 366	11%	535 645	16%	398 027	24%	4 236	11%
BODC	402	16%	37 274	16%	30 329	0%	383	16%
Coriolis	1 466	10%	127 401	16%	90 715	10%	1 382	11%
CSIO	127	27%	8 388	49%	5 879	20%	124	25%
CSIRO	533	14%	65 215	32%	35 006	11%	527	15%
INCOIS	274	16%	33 006	16%	21 061	2%	272	15%
JMA	1 144	7%	128 402	11%	83 666	10%	1 131	8%
KMA	161	10%	15 904	18%	9 982	0%	145	11%
KORDI	119	0%	14 142	22%	0		119	0%
MEDS	344	9%	35 639	11%	23 261	4%	336	8%
NMDIS	19	27%	1 193	81%	0		19	27%
Total	**8 955**	**11%**	**1 002 209**	**17%**	**697 926**	**16%**	**8 674**	**11%**

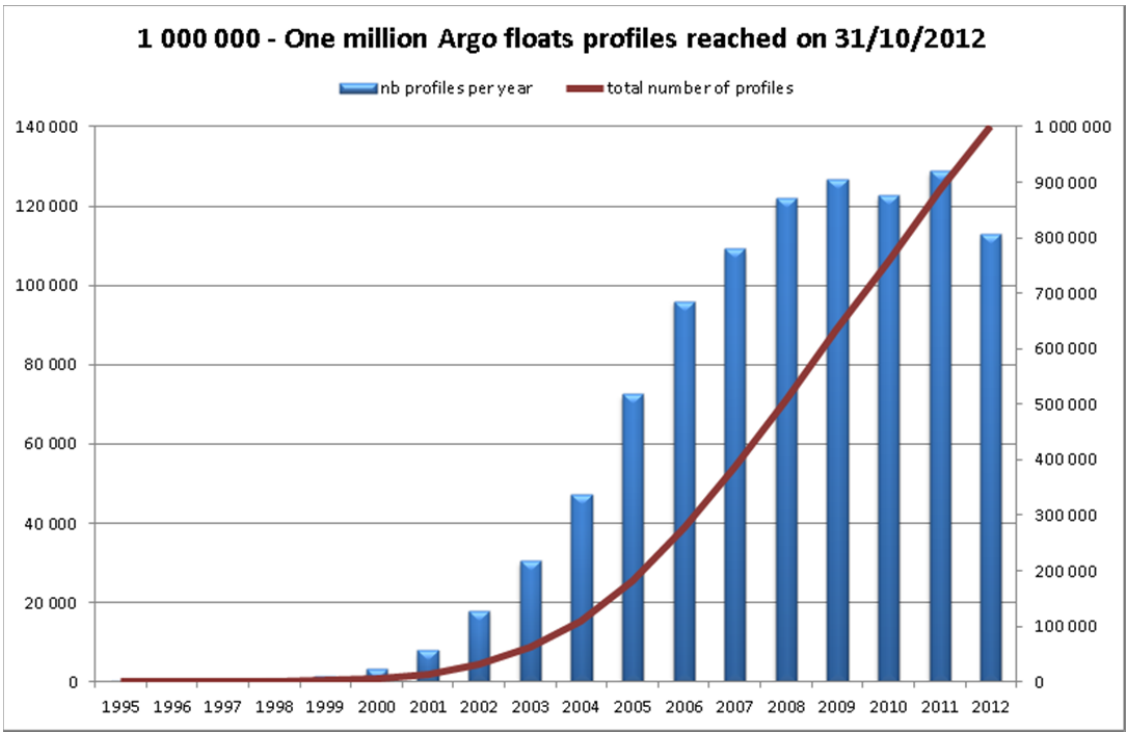
One million profiles available on Argo GDAC

Since October 30th 2012, more than one million Argo floats profiles are available on the GDACs ftp servers (global data assembly centres).

The millionth profile arrived on 31/10/2012 at 16:50:07.

This profile was transmitted by University of Washington float 5901891, cycle 147.

More on: http://www.argodatamgt.org/Data-Mgt-Team/News/One-million-Argo-profiles



Number of Argo profiles on GDAC ftp server, yearly distribution

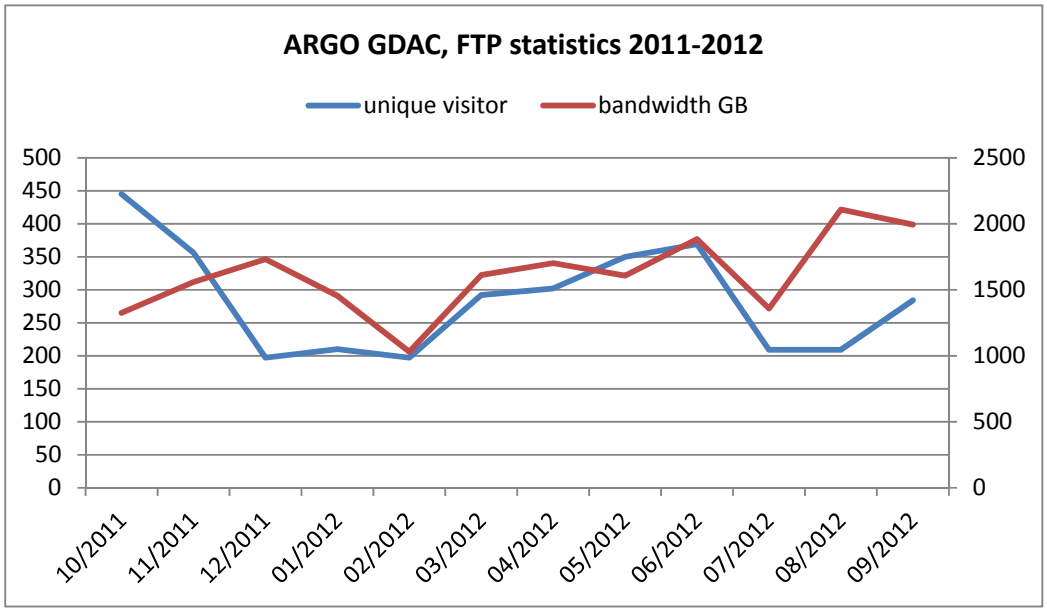
Operations of the ftp server

- Meta-data, profile, trajectory and technical data files are automatically collected from the national DACs ;
- Index files of meta-data, profile and trajectory are daily updated ;
- GDAC ftp address: ftp://ftp.ifremer.fr/ifremer/argo

There is a monthly average of 285 unique visitors, performing 2397 sessions and downloading 1614 gigabytes.

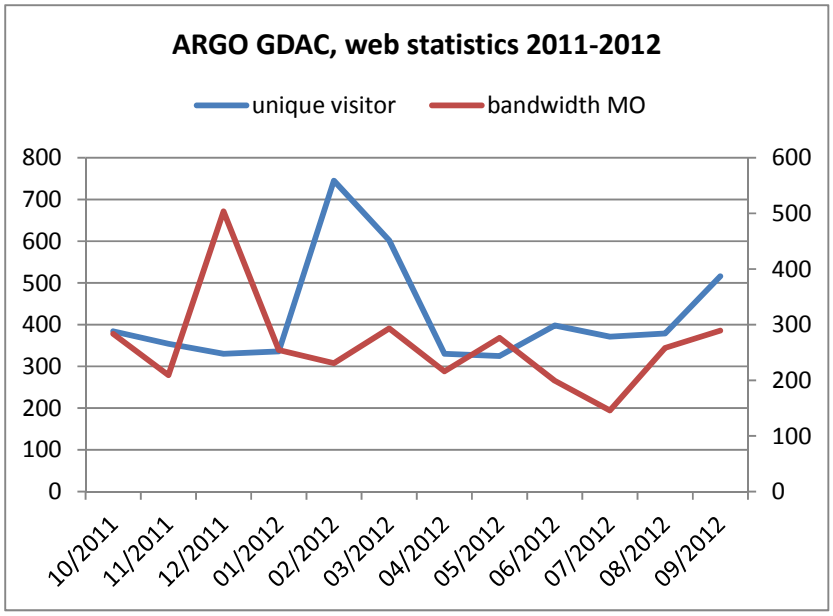
The graphics show a stable activity on GDAC FTP during the last 12 months.

ARGO GDAC FTP statistics				
month	unique visitor	number of visits	hits	bandwidth GB
10/2011	445	2 304	3 242 977	1325
11/2011	356	2 240	1 239 557	1558
12/2011	197	2 138	1 502 266	1732
01/2012	210	2 242	2 454 436	1455
02/2012	197	2 166	2 346 817	1030
03/2012	292	2 656	2 570 711	1612
04/2012	302	2 550	3 085 432	1702
05/2012	350	2 624	2 659 654	1607
06/2012	369	2 540	3 159 930	1884
07/2012	209	2 292	2 574 372	1357
08/2012	209	2 382	2 498 232	2108
09/2012	284	2 630	2 503 028	1993
Average	**285**	**2 397**	**2 486 451**	**1 614**



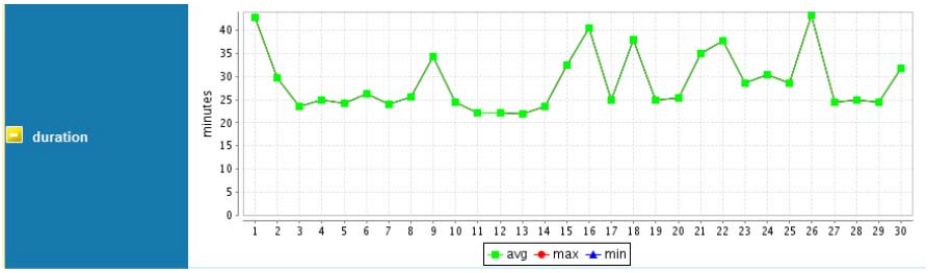
The web site address is: http://www.argodatamgt.org

ARGO GDAC web statistics				
month	unique visitor	visits	pages	bandwidth MO
10/2011	384	820	2 533	283
11/2011	354	655	2 483	209
12/2011	330	652	2 795	503
01/2012	336	601	2 271	254
02/2012	745	992	2 273	231
03/2012	602	866	3 486	293
04/2012	330	594	5 838	216
05/2012	325	526	5 844	276
06/2012	398	627	5 519	199
07/2012	371	664	5 622	146
08/2012	379	764	6 348	258
09/2012	516	939	6 527	289
Average	**423**	**725**	**4 295**	**263**



Data synchronization

The synchronization with US-Godae server is performed once a day.



Example of synchronization monitoring: duration of the process in June 2010

FTP server monitoring

The Argo GDAC ftp server is actively monitored by a Nagios agent (see http://en.wikipedia.org/wiki/Nagios).

Every 5 minutes, a download test is performed. The success/failure of the test and the response time are recorded.

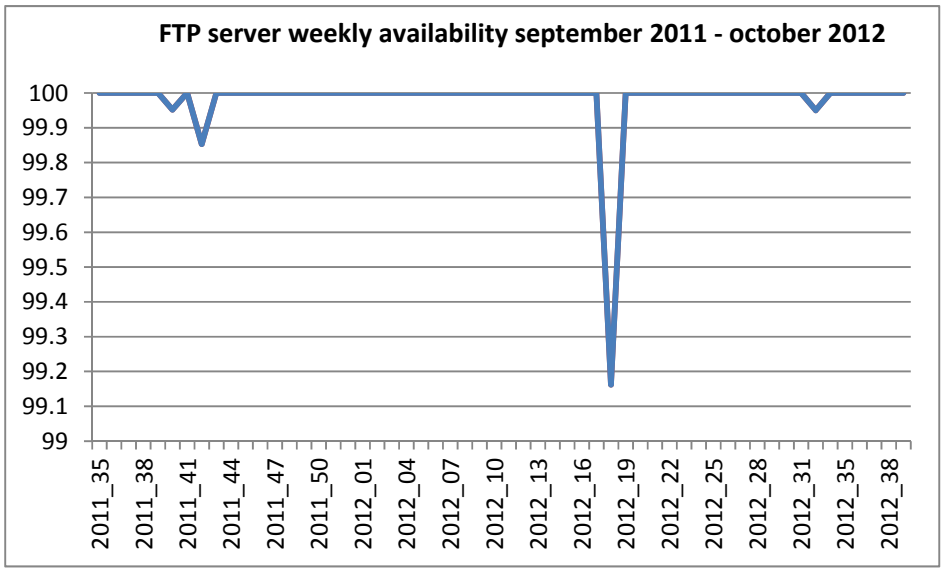
In April 2012, the FTP server was moved to a virtual server on a linux cluster. The reliability increased as well as the data transfer speed. The electrical power supply upgraded last year proved to be reliable; we did not face any electrical power supply problem.

The ftp server was **available for 99.98 %** of the time (compared to 99.69% last year)

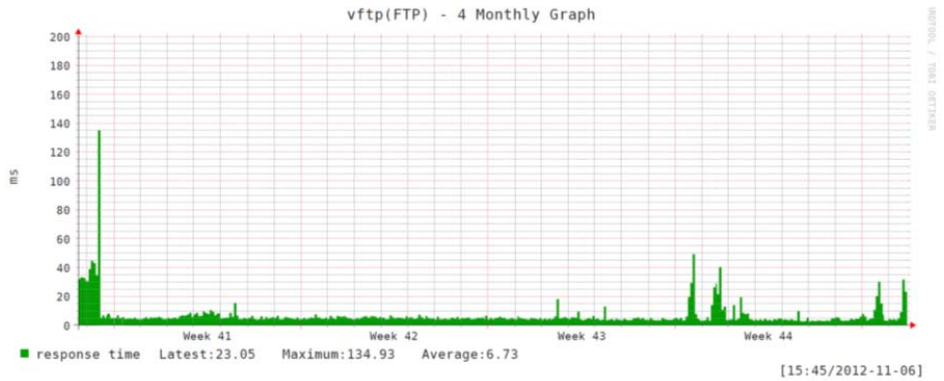
The 0.02% of failure represents **1 hour 52 minutes and 54 seconds of interruption** (compared to 1 day 5 hours and 45 minutes last year).

The main problems problem occurred on May 1st 2012. The ftp server failed down, but was automatically reactivated on another node of the cluster).

Compared to last year, the new ftp server dramatically increased the files transfer time **from 100ms to 4 ms**: the files are downloaded up to 25 times faster.



Nagios monitoring: between September 2011 and October 2012



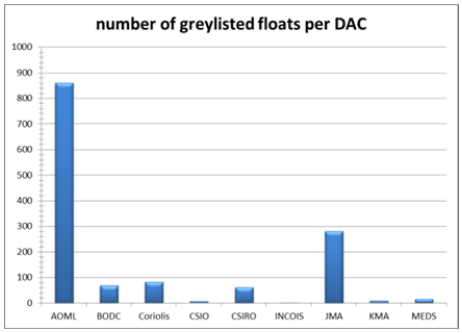
Nagios monitoring: duration of a test file download on October 2012

Grey list

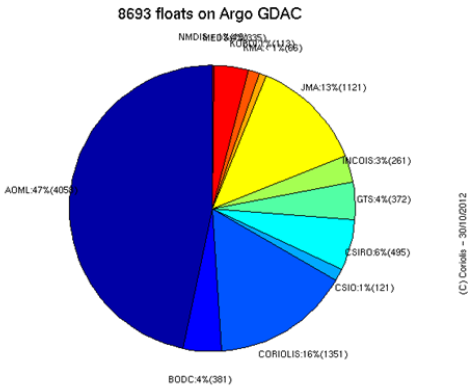
According to the project requirements Coriolis GDAC hosts a grey list of the floats which are automatically flagged before any automatic or visual quality control.

The greylist has 1384 entries (November 5th 2012), compared to 1181 entries one year ago.

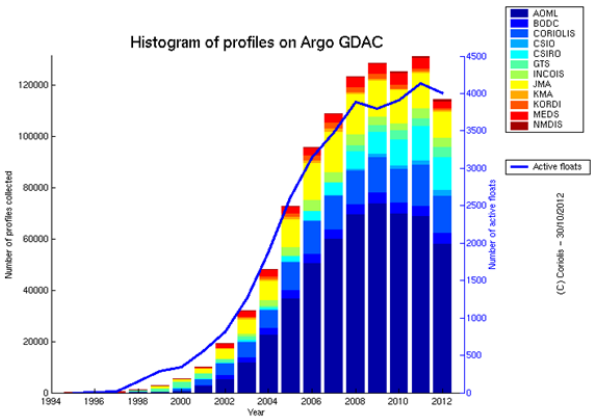
DAC	nb greylist files
AOML	860
BODC	68
Coriolis	82
CSIO	7
CSIRO	61
INCOIS	1
JMA	281
KMA	9
MEDS	15



Statistics of Argo data usage: Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …

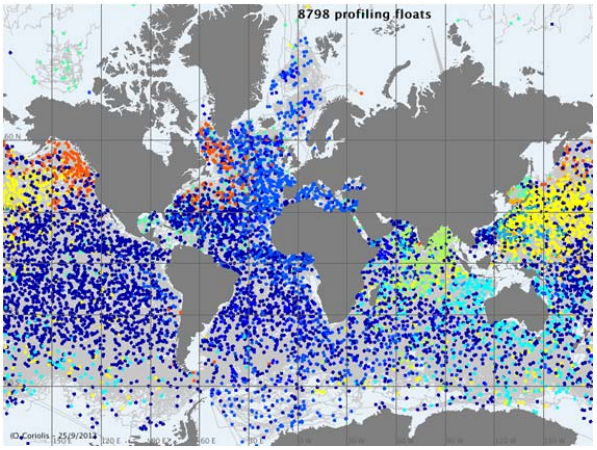


Argo GDAC : floats distribution per DAC in October 2012

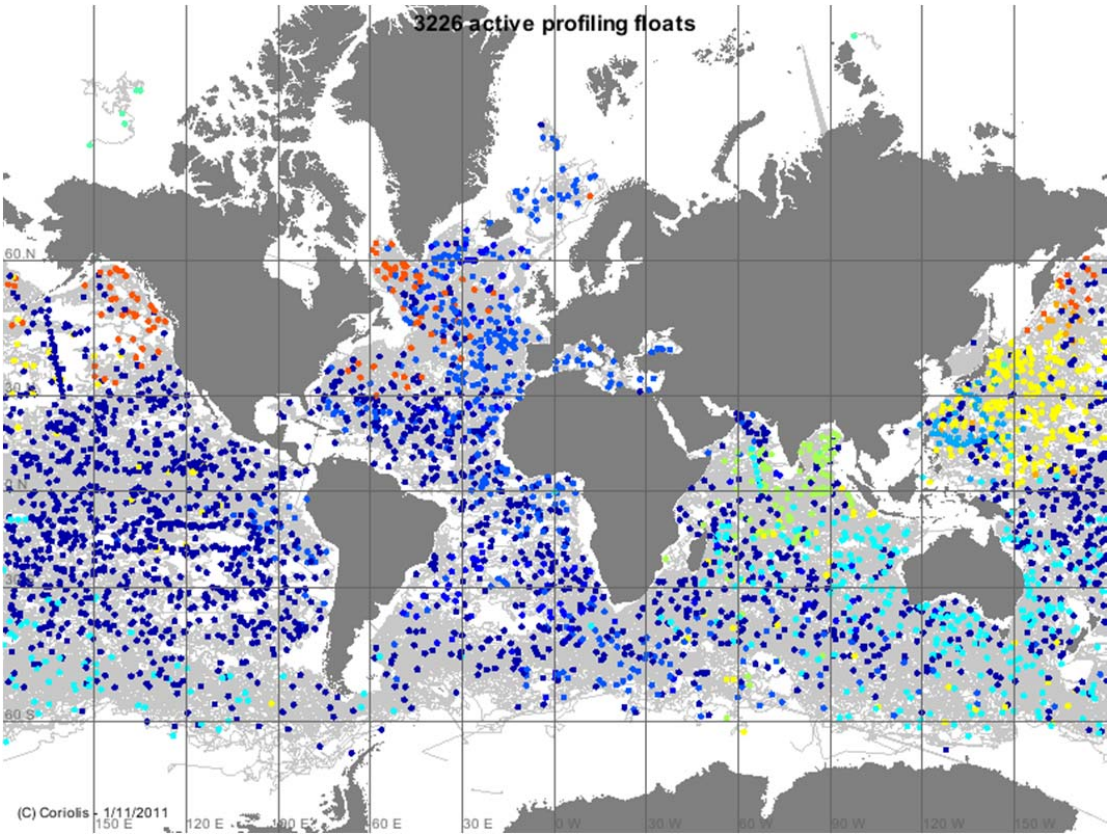


Argo GDAC : profiles distribution per DAC in October 2012[2]

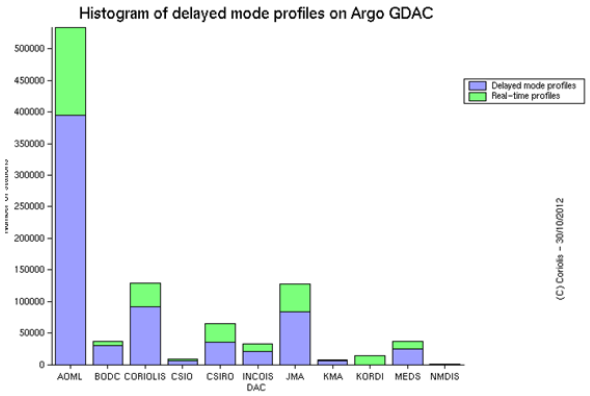
[2] Warning: the blue line displays the total number of active floats during a year. This total is different than the floats active at a particular day.



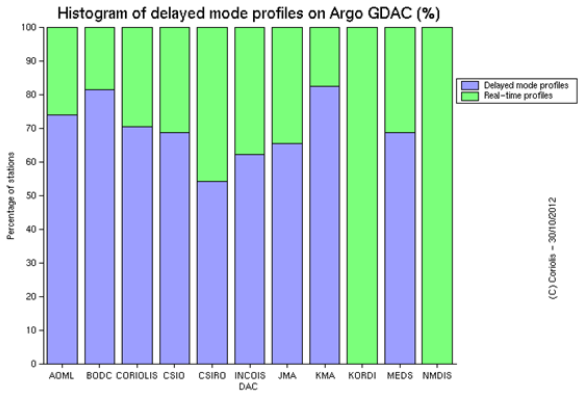
Argo floats available from GDAC in October 2012
(This map includes active and old floats)



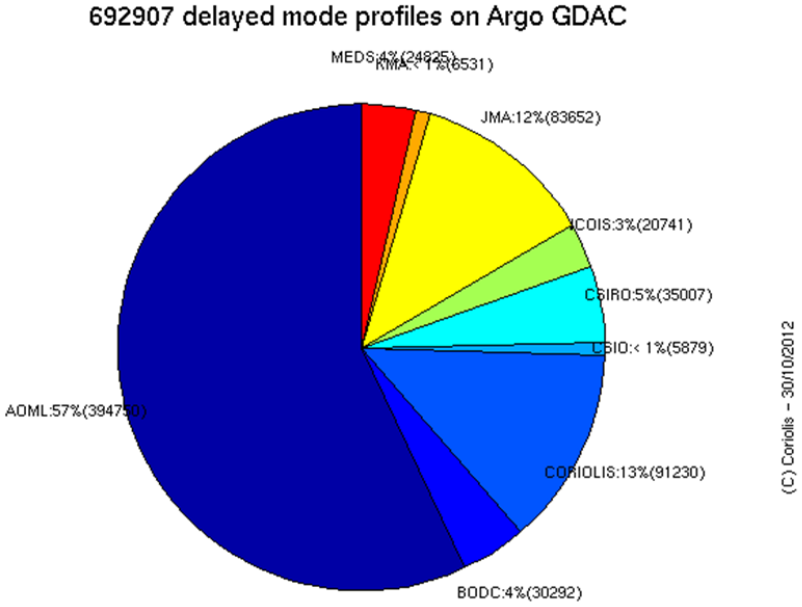
Active Argo profiling floats available from GDAC in October 2011



Argo GDAC : delayed-mode profiles available in October 2012



Argo GDAC : delayed-mode profiles distribution % per DAC in October 2012



Argo profiling floats with delayed-mode profiles available from GDAC in October 2012

Regional Centre Functions

(If your centre operates a regional centre, report the functions performed, and in planning)

Coriolis is involved in the North Atlantic Argo regional centre (NAARC).

This activity is managed within the European project Euro-Argo. It involves a regular monitoring of the consistency of the quality of data from various types of floats, with techniques such as objective analyses, comparison between floats and altimetry.

The CTD reference data base development is also a contribution to NAARC, as well as the floats deployment coordination.

Argo Data Management Team 2012
CLS Report

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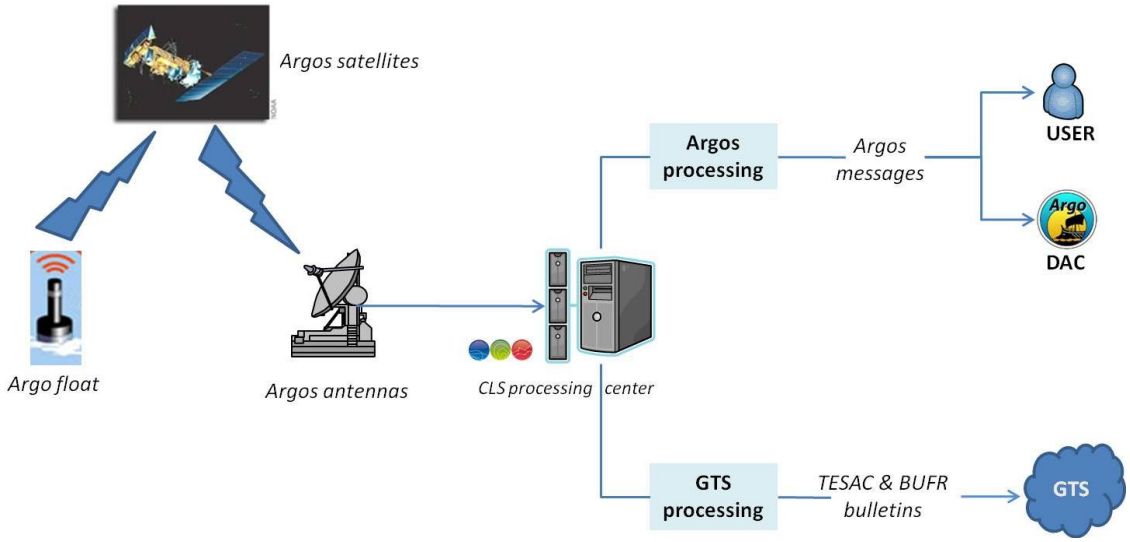
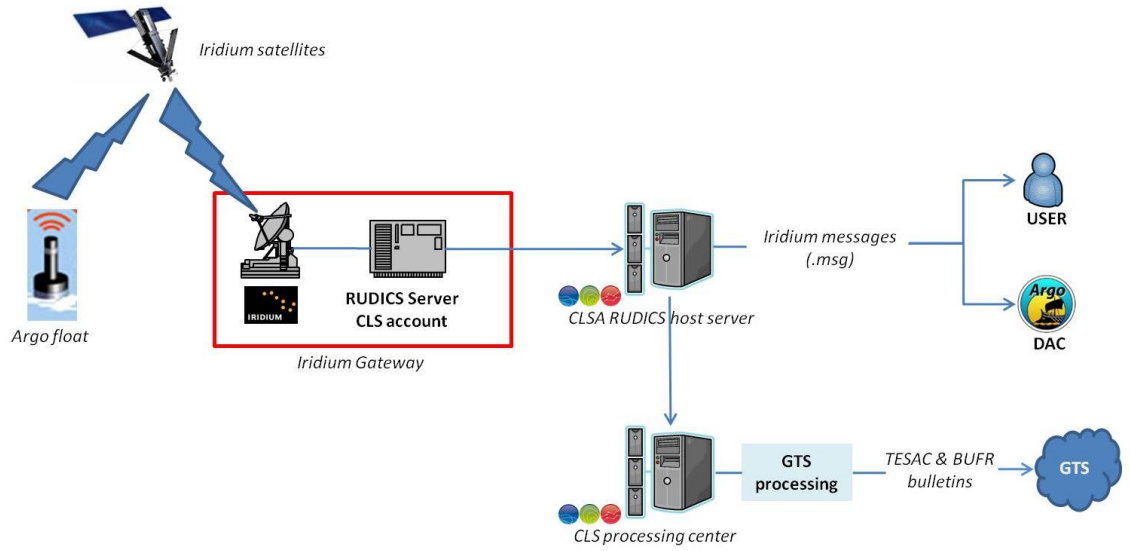
Telephone 05 61 39 47 00 Fax 05 61 75 10 14

1. CONTEXT

The CLS Company, responsible for Argos system, has a DAC (Data Assembly Center) function for Argo programs which do not have real time processing capabilities. This operational (24h/24h on 365 days/year) data processing is a free added value Argos service. Argo data are processed by CLS for GTS distribution both in CLS France and CLS America Incorporation.

In September 2012 CLS processed in real-time 102 Argo floats (86 with Argos and 16 with Iridium satellite system) for the GTS distribution. Data for these floats are sent via ftp to Meteo-France (Toulouse) in TESAC and BUFR bulletins and then Meteo-France put them on the GTS (Global Telecommunication System). Figures below summarize the Argo data flow since their transmission by the float until their dissemination on the GTS with Argos and Iridium satellite systems.





2. STATUS OF THE CLS DAC IN SEPTEMBER 2012

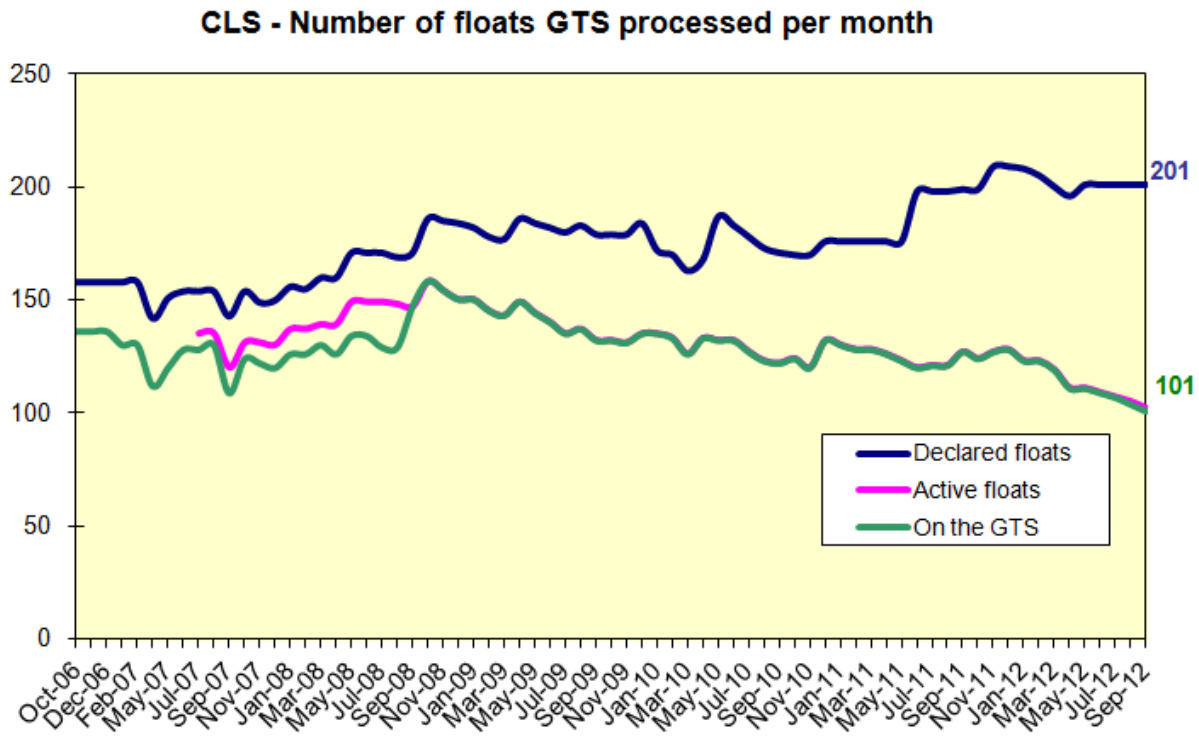
- **Data acquired from floats :**
  - 201 floats were declared in the CLS GTS database
  - 101 floats disseminated data profiles on GTS
  - 110 floats are inactive (no more transmission) or grey listed (failing status)
  - 10 floats are not yet deployed
  - 448 profiles from CLS were sent on GTS in September 2012

- **Description of the 201 floats :** CLS processed in real time floats for Argo program which are not hosted by a national DAC:
  - 79 INCOIS floats (India)
  - 88 SOA floats (China)
  - 34 KORDI floats (Korea)

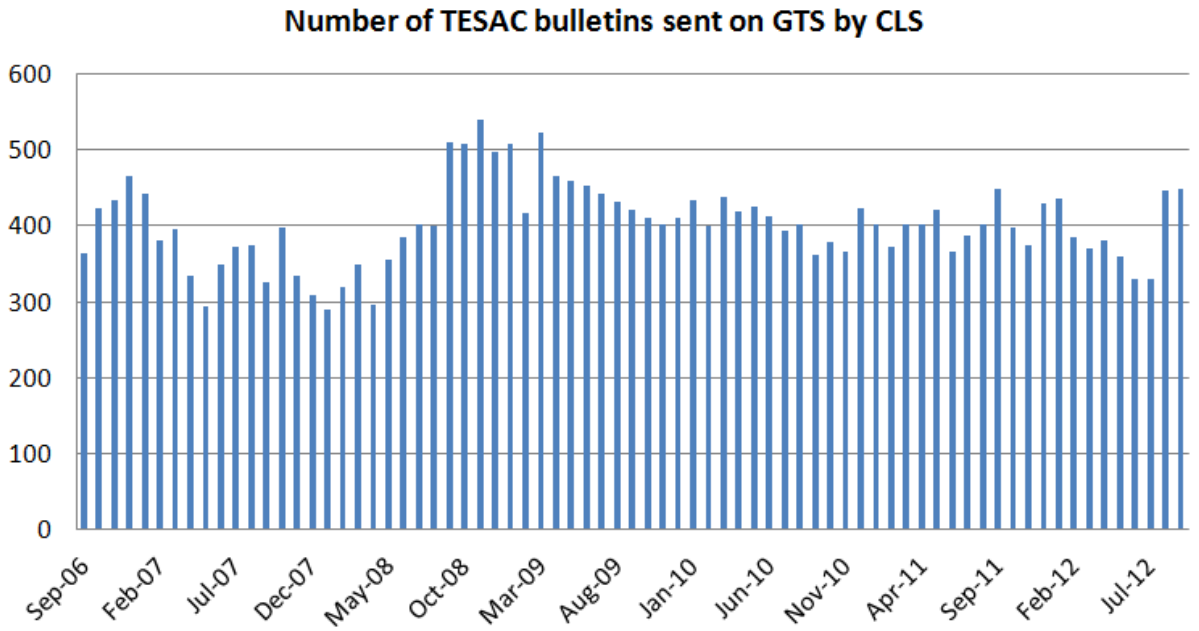
All these floats are Webb Apex floats with 17 different data formats.

- **Data issued to GTS:** All data processed by CLS are distributed on the GTS by way of Meteo-France (GTS header LFVW) or by the National Weather Service (GTS header KARS) when the French center is in backup. This operation is automatically performed and GTS bulletins are sent to Meteo-France every 2 minutes. Before the encoding in TESAC and BUFR bulletins, Argo data are filtered by Argo QC procedure. The GTS processing at CLS is operational and in backup with the CLS America processing center in Largo, Washington DC, 7/7 24/24. 4691 profiles were relayed onto GTS from October 1st, 2011 to September 31th, 2012 (source: Météo-France)

- **Argo Real Time processing monitoring:** All different data formats are referenced and each format has a dedicated template (processing model) in the CLS GTS database. Each month, a monitoring is made for Argo floats present in the CLS GTS database:
  - Argos transmissions in the last month are checked for all floats,
  - GTS disseminations in the last month are checked for all floats,
  - New floats to be set up for GTS are implemented in CLS GTS data base at each beginning of month with a list (table 10: “Floats to be set up for GTS”) provided by JCOMMOPS (M. Belbeoch) in the Argo Information Centre Monthly Report.
  - Active floats to be grey listed are removed from the CLS GTS database at each beginning of month with a list (table 15: “Active floats Grey list”) provided by JCOMMOPS (M. Belbeoch) in the Argo Information Centre Monthly Report.



Status of CLS Argo GTS processing



Number of profiles sent on the GTS by CLS per month

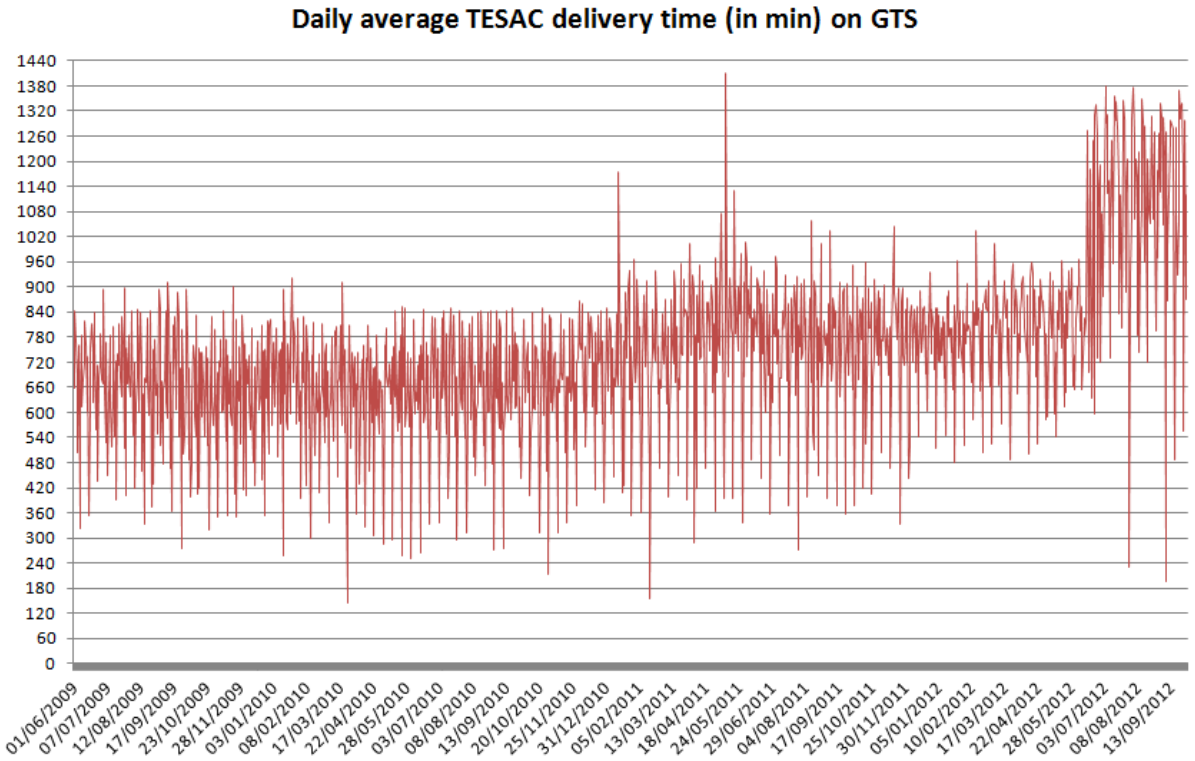
- **Web pages**: All GTS observations (profiles for Argo) are available on https://argos-system.cls.fr/cwi/Logon.do. It consists of a user access to his observation data.

- **BUFR format**: BUFR bulletins are produced in addition of TESAC bulletins for all floats GTS processed by CLS (header: IOPX92 LFVW) since August 2009.

- **Missing pressure levels in BUFR:** In order to decrease the number of missing levels in BUFR bulletins**,** a SQL patch will be applied end of June 2012 to extend the BUFR bulletin construction period to 20 hours.

- **INCOIS floats**: Upon INCOIS request CLS has stopped the GTS processing for all Indian Argo floats on the October 16th, 2012 at 11H UTC. GTS processing for INCOIS floats is now performed by INCOIS in Hyderabad and displayed on the GTS via New Delhi.

- **Time of delivery on GTS**: A monitoring delay tool, specified with JCOMMOPS is operational since September 2008 at CLS. The average time of TESAC delivery on GTS is shown in the graph below. We can see the extension of the bulletin construction period to 20 hours in June 2012.



3. ARGOS SYSTEM STATUS

3.1. SPACE SEGMENT

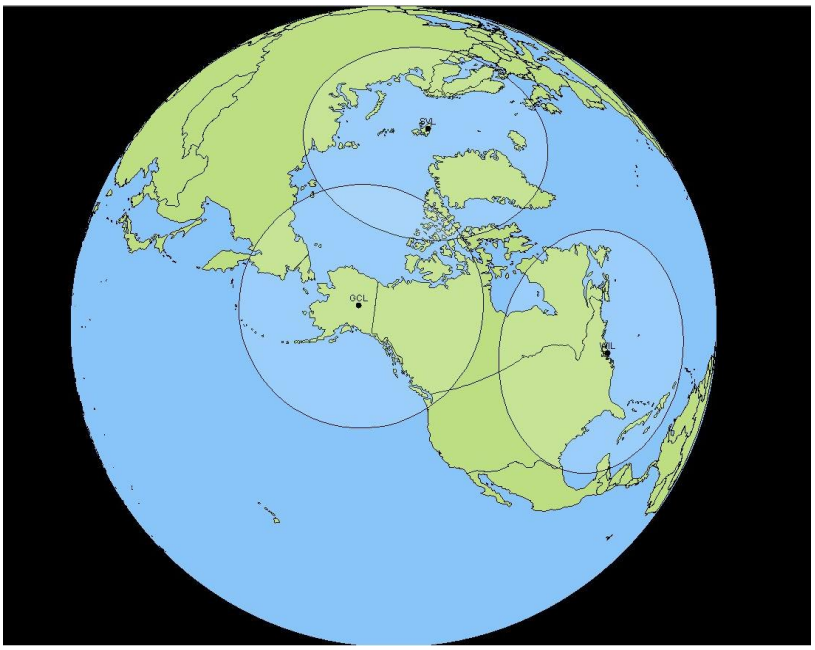
After the successful launch of METOP-B with an Argos-3 instrument onboard, the Argos constellation is now composed by 7 operational satellites: five NOAA POES and two EUMETSAT spacecrafts. The Argos service on METOP-B will be opened to all Argos users in January 2013. Next launches of satellites with Argos instrument are:

- SARAL (ISRO) with an Argos-3 instrument 12/12/2012
- JPSS-1 (NOAA) with an Argos-4 instrument in 2015
- METOP-C (EUMETSAT) with an Argos-4 instrument in 2017
- JPSS-2 (NOAA) with an Argos-4 instrument in 2020

3.2. GROUND SEGMENT

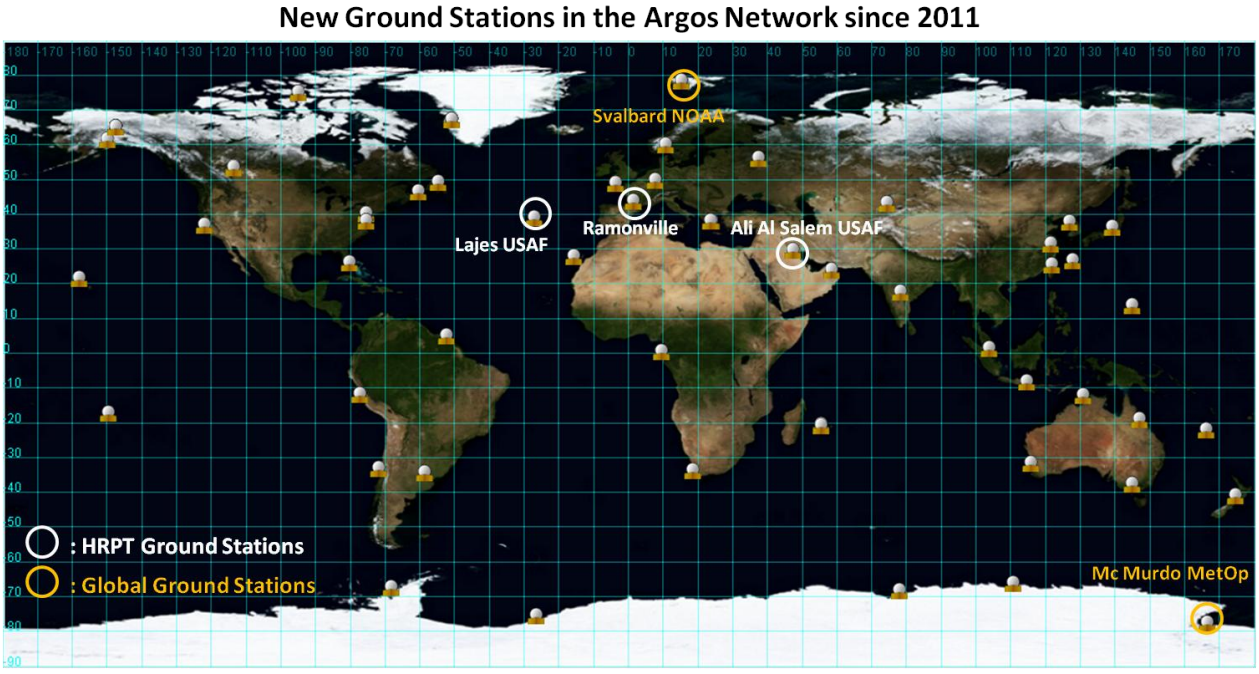
Global antennas network: The Argos global antennas network is composed by five stations:

- The two NOAA global stations of Fairbanks and Wallops acquire the global recorded telemetry transmitted by N15, N16, N17, N18 and N19.
- The EUMETSAT global receiving station of Svalbard acquires the global recorded telemetry transmitted by Metop-A as well as the two daily blind orbits of N18 and N19 for NOAA stations.
- A new Svalbard antenna operated by NOAA that delivers NOAA 15/16/17/18 blind orbits when not in conflict with NOAA-19. Please note that these blind orbits were previously received from the EUMETSAT Svalbard antenna (via NOAA). This improves data delays because these orbits are now received directly after the pass.
- The NOAA McMurdo antenna in Antarctica that only received Metop-A and Metop-B half orbits. This antenna is operational since 08/06/2011.



The Argos Global antenna network (without McMurdo)

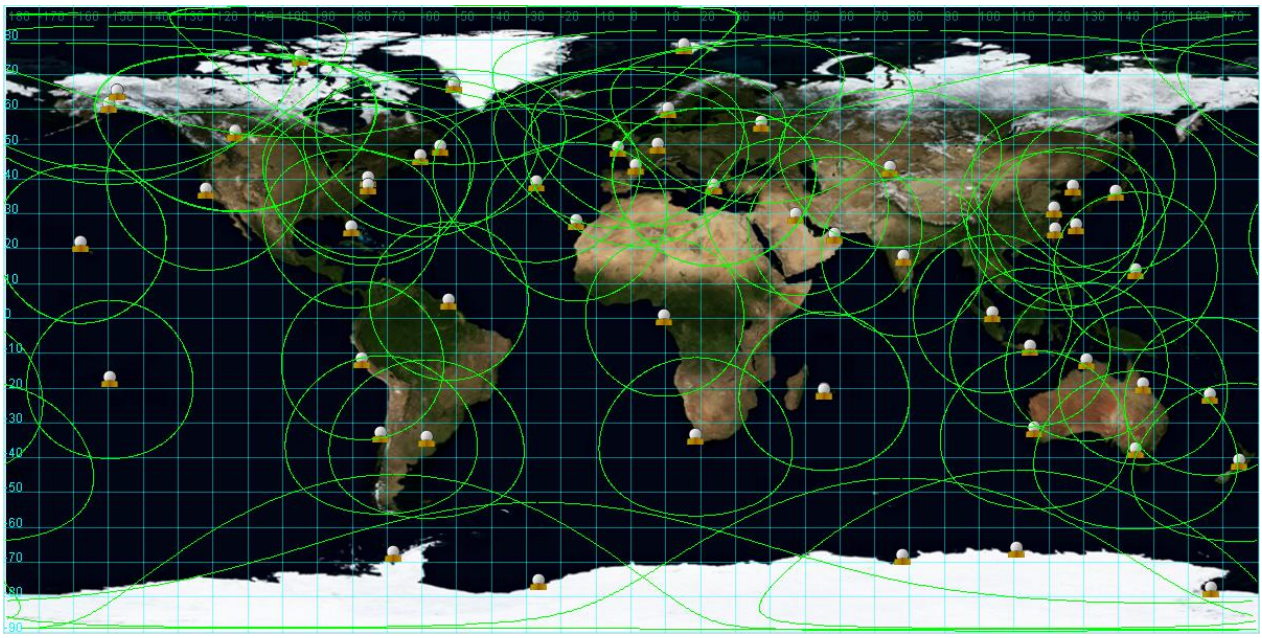
Real time antenna network: In 2011, CLS was still focused on the HRPTA4 project that consists of upgrading selected antennas in order to be compatible with METOP and SARAL satellites. This project also aims to optimize in terms of performances the real-time receiving stations network/



New Argos HRPT stations in 2011

Today, both Toulouse and Lanham processing centers receive Argos real-time data from 65 stations located all over the world. Please note that the Aludeid antenna was decommissioned and removed from the network on February 2012.

Here below are displayed the Argos HRPT coverage world map of the 65 operational stations part of the Argos real-time antennas network.



Argos Real-time coverage map

Processing centers: The two global processing centers in Toulouse (France) and Lanham (Maryland, USA) were nominal over 2011 and first semester of 2012. Redundancy is used at least once a month (Up to two times on one month). Redundancy means all Argos users rerouted to CLS or CLSA during an anomaly on the nominal global processing center.

Each global processing center is autonomous and can work alone. In normal mode, both processing centers receive process and distribute Argos data to:

- North American users for CLS America,
- Users of the rest of the world for CLS France.

In case of a problem with one of the two centers, the other one stays alive and is capable of receiving, processing and distributing Argos data to ALL users. The switch to the remaining alive center is completely transparent for the users. It means that the users continue to receive or to access their data, without changing anything on their side. CLS has a 99.64% system availability with three processing centers in back-up (two nominal and one disaster recovery).

In June 2011, CLS America processing center moved to a new building in Lanham, Maryland. A double power outage occurred in July 2011 due to a generator issue.

The new building that will hosts the new CLS processing centre is still under construction in front of current CLS building. The project of moving Personnel, IT infrastructure and all operations staff into the new CLS building facilities will start in October 2012. This moving has to be transparent for our Argos customers and need to be prepared. A moving testing day is scheduled in September in order to

be sure that all operations will be secured. All Operations Staff is mobilized on this project in order to satisfy all Customer services and minimized the operations' impacts.

New CLS control and monitoring room

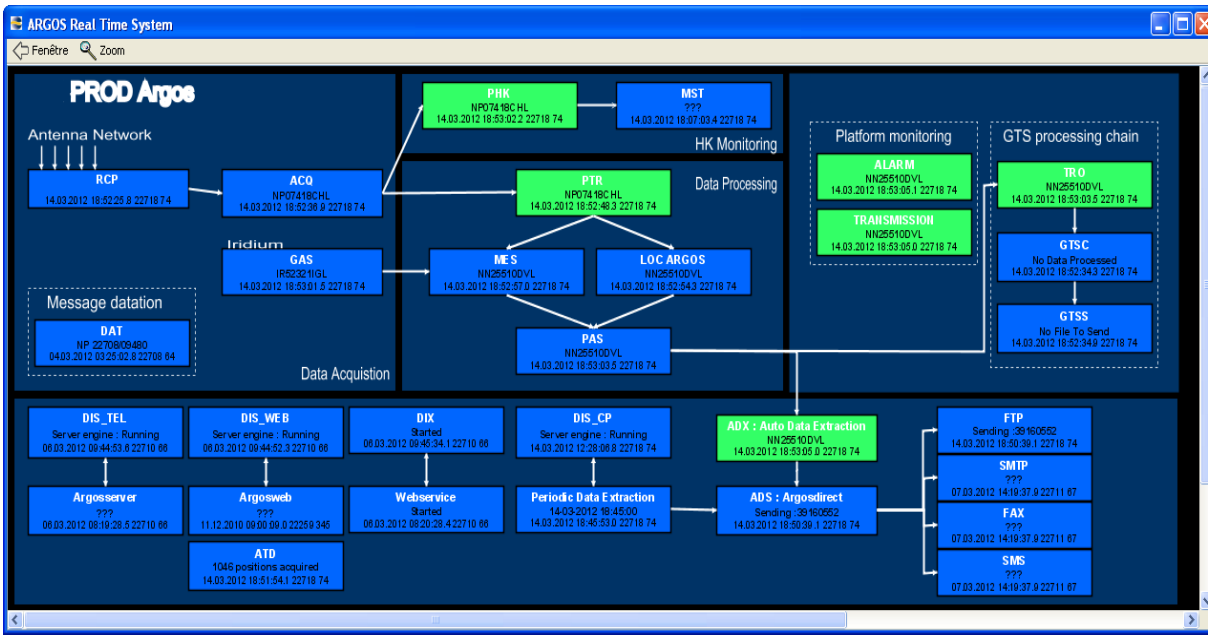
In 2011, we initiate a rebuilt of ARGOS application servers, in order to prepare the next decade. This process was started on the development configuration in CLS France. The application server is now based on CentOS Linux release 6.0, 64 bits (rather than RedHat, 32bits). In 2012, progressively these changes on operating systems will be propagated up to the production environment, both in CLS America and CLS France datacenters.

In 2012, in order to address the increase of quantity of data to be processed (due to the launch of METOP-B and SARAL spacecraft), space disk will be increased. Moreover, the databases backup mechanism will be optimized and updated.

The CLS Argos processing chain: Composed of different software modules, the processing chain is in charge of receiving and processing the Argos data issued from the satellites and acquired by the global and real-time ground stations networks.

Argos data are processed in terms of collect and location, and stored into a database.

The processing chain is also in charge of distributing the data by ADS (Automatic Distribution System) or allowing users to access to their data using Telnet, ArgosWeb or the web services.

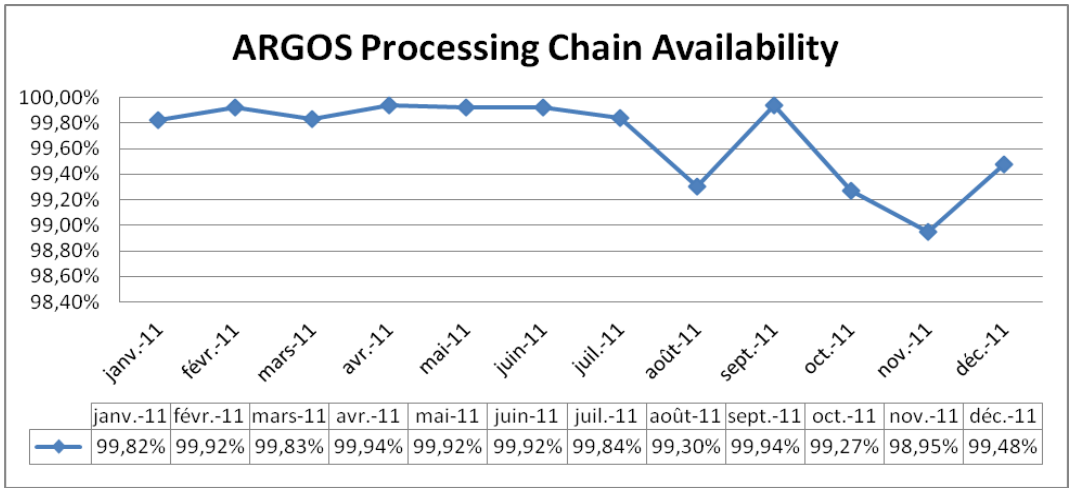


Synoptic of the CLS Argos processing chain

In order to monitor the Argos processing centers, statistics are produced in real-time:

- on the availability of Argos data distribution tools,
- on the data delivery time for sample platforms,
- on Argos location delivery time for sample platforms,
- and on the percentage of data available in less than one hour.

In 2011, the average availability was **99,68%**. This indicator corresponds to the percentage of real time datasets processed in less than 10 minutes (Between Pre-Processing component PTR and PAS component in charge of inserting data in database for user requesting). This number does not include periods when French site was in backup mode on the US site.



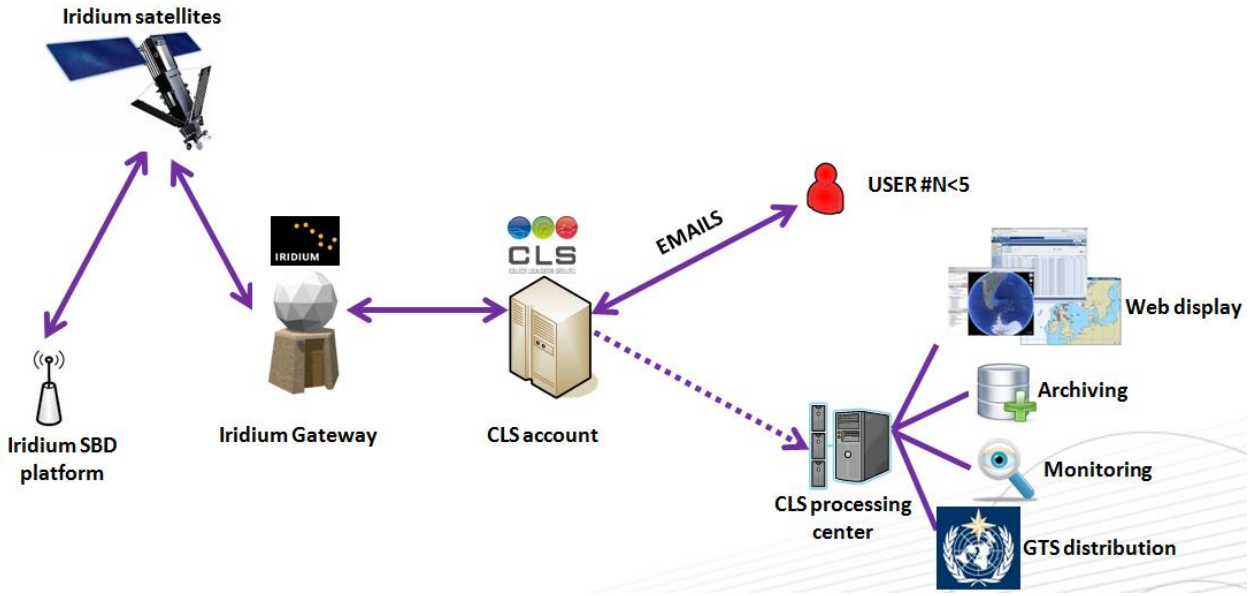
	janv.-11	févr.-11	mars-11	avr.-11	mai-11	juin-11	juil.-11	août-11	sept.-11	oct.-11	nov.-11	déc.-11
	99,82%	99,92%	99,83%	99,94%	99,92%	99,92%	99,84%	99,30%	99,94%	99,27%	98,95%	99,48%

Argos Processing SLA follow up in 2011

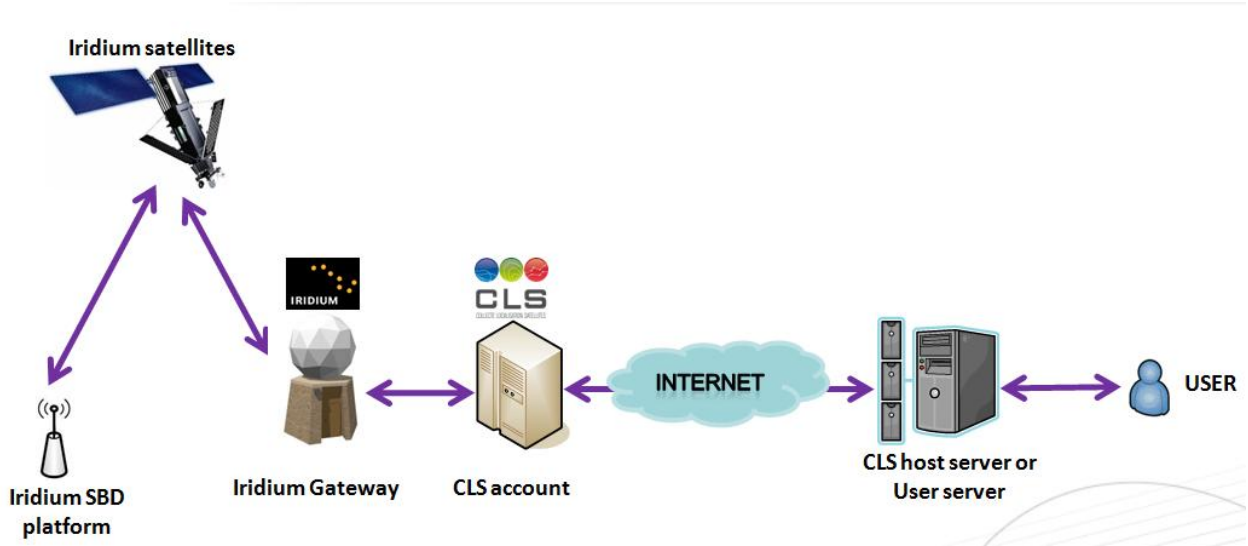
4. CLS IRIDIUM DATA SERVICES

CLS, exclusive operator of the Argos system since 1986 now also provides dedicated Iridium data services to ocean platforms (profiling floats, gliders, drifting buoys…) since 2007. Thanks to a VAR (Value Added Reseller) agreement with Iridium, CLS is an Iridium data provider for Argo. It's already the case for several Argo programs as France, China, Germany, Italy, India, Norway, Spain and UK.

CLS is providing all Iridium services for all type of floats: RUDICS, CSD and SBD. Thanks to a long-standing partnership with main floats manufacturers (Teledyne, NKE, Optimare…) Iridium services activation and transmission tests could be performed easily.



The Iridium SBD communication service at CLS



The Iridium RUDICS communication service at CLS

CLS and CLS America processing centres are linked with an IP connection to the Iridium Gateway receiving Iridium raw data from floats in real-time, then process and distribute them to the Argo users by email or FTP. The service is fully operational 24/7. If needed, GTS real-time processing (TESAC and BUFR bulletins) can be done by CLS. For all further information, please contact Mr. Yann Bernard at ybernard@cls.fr.

Argo Germany National Data Management Report 2012
November 2012

1. Status

Data acquired from floats.

Most of the floats deployed by Germany are operated by BSH but additional funding has been acquired by various research institutes. From November 2011 to October 2012, BSH deployed 38 floats, additional 52 floats will be deployed in the Atlantic Sector of the Southern Ocean and in the Weddell Sea during Polarstern cruise ANT-XXIX/2 between November 2012 and January 2013: 50 by AWI and 2 by BSH. The deployments in the Southern Ocean have started in 2010 and are still continuing. Currently (November, 1st 2012) 167 German floats are active. The total number of German floats deployed within the Argo program increased to 504 and the total number of received profiles is 37726. Most of the German floats are APEX floats purchased from Webb Research, but a smaller amount of floats are manufactured by the German company Optimare. Optimare has been working in close collaboration with the AWI and has developed a float type suitable for partially ice covered seas. These floats are equipped with an ice sensing algorithm which prevents the float from ascending to the surface under ice conditions and prevents it from being crushed. Float profiles are stored internally until they can be transmitted during ice free conditions. Most of the German floats are equipped with the standard Seabird CTD but occasionally additional sensors as Aanderaa optodes and Rafos acoustic receivers are installed.
In 2012 BSH deployed also two NOVA (New generation Oceanographic Variable-buoyancy Autonomous) profiling floats from MetOcean in Canada. The floats have been deployed in the western part of the North Atlantic in July 2012. The NOVA floats are equipped with Iridium satellite telemetry, which allows for quicker, bi-directional, and more cost effective data transmissions. Both floats work reliable and have provided up to now 20 high quality profiles.

There are currently no major technical problems

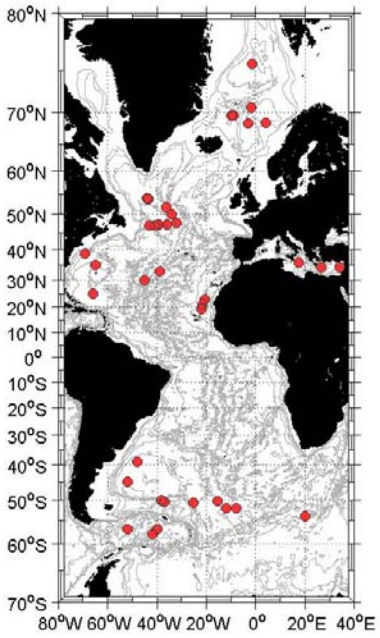


Fig.1: German deployments from November 2011 to October 2012: 38 floats

Two floats deployed in the Mediterranean were lost early in their mission: one with WMO-ID 6901083, deployed in April 2012 was found beached in Crete, Greece. The beaching was detected with the help of the AIC and the float was recovered by the Greek colleagues and send back to Germany and it will be re-deploy after requiring service. The second float has beached or it was picked up in shallow water close to Beirut.

Deployment plan for 2013

The deployment plans for 2013 will comprise 40-42 floats from BSH in the Atlantic, 8 floats from GEOMAR in the eastern subtropical Pacific and an unknown number of floats from AWI, which will be deployed in the Southern Ocean and in the Weddell Sea in the Antarctic summer season 2013/2014. The deployment will be performed in co-operation with the German research institutes. Germany owns deployment capabilities for all oceans including the ice covered areas but foreign research cruises will be used as well to cover all intended deployment areas.

The main goal is to support the global array in the Atlantic Ocean and will focus on data sparse regions, specifically in the Southern Ocean, the western North Atlantic, the Nordic Seas and the Mediterranean. The exactly deployment positions have not been determined yet.

Data issued to GTS

The profiles for all German floats are processed by Coriolis and are distributed on the GTS by way of Météo-France.

Data issued to GDACs after real-time QC

The real-time data processing for all German floats is performed at the Coriolis Center in France. Data processing follows the procedures set up by the Argo Data Management Team.

Data issued for delayed QC

The delayed mode processing is distributed between the various German institutions contributing to Argo, depending on their area of expertise. AWI is responsible for the Southern Ocean, IfM-Hamburg together with BSH is processing the German floats in the Nordic Sea, and BSH is covering the tropical, subtropical Atlantic and subpolar Atlantic. The sharing of delayed-mode data processing will be continued in the coming years, but BSH will cover all the German floats which have not been assigned a PI. BSH also has adopted some European floats which did not have a DMQC operator assigned to them, such as national Argo programs from the Netherlands, Denmark, Norway, Finland and Poland. All German institutions have been working in close collaboration with Coriolis and delayed mode data have been provided on a 6 monthly basis. Delays in delayed-mode data processing have occurred occasionally due to changes in personal and delay in data transmission in the Southern Ocean due to ice coverage. Delayed-mode data processing follows the rules set up by the Data Management Team. The DMQC process is well underway and no major delays have been encountered.

Delayed data send to GDACs

All delayed mode profiles have been sent to GDACs. The total number of received profiles is 37726 (November,1st 2012, the number of DM profiles is 34190. The percentage of DM profiles with respect to the total number of profiles is about 90%.

Web pages

BSH is maintaining the Argo Germany Web site. The URL for the Argo Germany is:

http://www.german-argo.de/

It provides information about the international Argo Program, German contribution to Argo, Argo array status, data access and deployment plans. It also provides links to the original sources of information.

Statistics of Argo data usage

Currently no statistics of Argo data usage are available.

Products generated from Argo data

A key aspect of the German Argo program is to develop a data base for climate analysis from Argo data, to provide operational products for interpretation of local changes and to provide data for research applications.

Argo data are being used by many researchers in Germany to improve the understanding of ocean variability (e.g. circulation, heat storage and budget, and convection), climate monitoring and application in ocean models.

Germany contributes to the NARC and contributes recent CTD data to the Argo climatology.

Argo National Data Management Report (2012) – India

1. Status

- **Data acquired from floats**
  India has deployed 35 new floats (including Iridium and AROVOR CTS-3 from NKE) between November 2011 and October 2012 in the Indian Ocean taking its tally to 274 floats so far. Out of these 103 floats are active. All the active floats data are processed and sent to GDAC.

- **Data issued to GTS**
  INCOIS is now officially sending GTS message of all the Indian float profiles through the RTH New Delhi. CLS ARGOS was asked to discontinue, sending Indian floats data in TESAC format to GTS. We thank CLS ARGOS for their help all these years.

- **Data issued to GDACs after real-time QC**
  All the active floats (103) data are subject to real time quality control and are being successfully uploaded to GDAC. RT s/w obtained in collaboration with CSIRO is extensively used for the same. The support of CSIRO in term of the Real Time S/W is highly acknowledged.

- **Data issued for delayed QC**
  In total 69% of the eligible profiles for DMQC are generated and uploaded to GDAC. The processing of Iridium floats is under process.

- **Web pages**
  - INCOIS is maintaining Web-GIS based site for Indian Argo Program. It contains entire Indian Ocean floats data along with trajectories. Further details can be obtained by following the link http://www.incois.gov.in/Incois/argo/argo_home.jsp. Apart from the floats deployed by India, data from floats deployed by other nations in the Indian Ocean are received from the Argo Mirror and made available in the INCOIS website. User can download the data based on his requirement.
  - Statistics of Indian and Indian Ocean floats are generated and maintained in INCOIS web site. The density maps for aiding people for new deployments are made available on a monthly basis. For full details visit http://www.incois.gov.in/Incois/argo/argostats_index.jsp.

- **Trajectory**
  1. A total of **274 trajectory** netcdf files were processed and uploaded to the GDAC. The process of generation of trajectory netcdf files undergoes quality checks like position, time, cycle number, etc., and corresponding quality status is assigned to each parameter. Finally a visual check is performed to verify that there are no missing cycles without cycle numbers and to check the surface time intervals.
  2. Trajectory files in the newer version (Ver 2.3) yet to be done. We are collaborating with CSIRO and will be generating them shortly.

- **Statistics of Argo data usage**
  Argo data is widely put to use by various Organisations/ Universities/ Departments. Indian Meteorological Department (IMD) is using Argo data for

their operational purpose. Scientists, Students and Researchers from INCOIS, NIO, SAC, C-MMACS, NRSA, IITM, NCMRWF, IISc etc are using Argo data in various analysis. Many paper based on Argo data were also published in reputed journals. See the references below.

INCOIS Argo web page statistics (for the past one year) are as shown below

Page	Hits	Visitors
Argo Web-GIS	3273	1721
Data download	12952	892
Live Access Server	1590	1022
Argo products	1071	902

- **Products generated from Argo data**
    1. Value added products obtained from Argo data are continued. The methodology for generating the gridded product is changed to variational analysis method. Many products are generated using Argo temperature and salinity data. The Argo T/S data are first objectively analysed and this gridded output is used in deriving value added products. More on this can be see in the RDAC functions.
    2. Version 2.1 of DVD on "Argo data and products for the Indian Ocean" is released to public for use with data corresponding to 2012 being updated. This DVD consists of ~ 1,70,000 profiles and products based on the Argo T/S. A GUI is provided for user to have easy access to the data. As many as 78 DVDs were supplied to various users from institutions and universities.
    3. ATLAS of Mixed Layer and Sonic Layer Depth Climatology based purely on Argo observation is accomplished and submitted to NODPAC Indian Navy. Last week this hard copy of the ATLAS and software developed for viewing the same is formally handed over to Director, DNOM for their use in naval applications.
    4. Continued making products available on LAS. New products viz., model outputs, new wind products (ASCAT), fluxes are made available. We plan to add more and more products as per the request received from the users in future. For further details visit http://las.incois.gov.in.

2. Delayed Mode QC

- INCOIS started generating and uploading D files to GDAC form July 2006, and as of today, profiles belonging to all eligible floats have been subjected to DMQC.
- Advanced Delayed Mode Quality Control s/w developed by CSIRO is being put to use successfully. Using this s/w all the eligible floats are reprocessed to tackle pressure sensor offset problems, salinity hooks, thermal lag corrections, salinity drifts.
- Lack of enough historical background data is hindering the DMQC processing. In the past one year, good amount of CTD is collected from many sources. But majority of the Indian floats are found not to have big drifts in the salinity sensors.
- About 69% of the eligible profiles are subjected to DMQC and the delayed mode profiles are uploaded on to GDAC.

- Iridium floats and APF9A floats data is currently being processed in delayed mode and will be made available on GDAC shortly.

3. GDAC Functions

INCOIS is not operating as a GDAC.

4. Regional Centre Functions

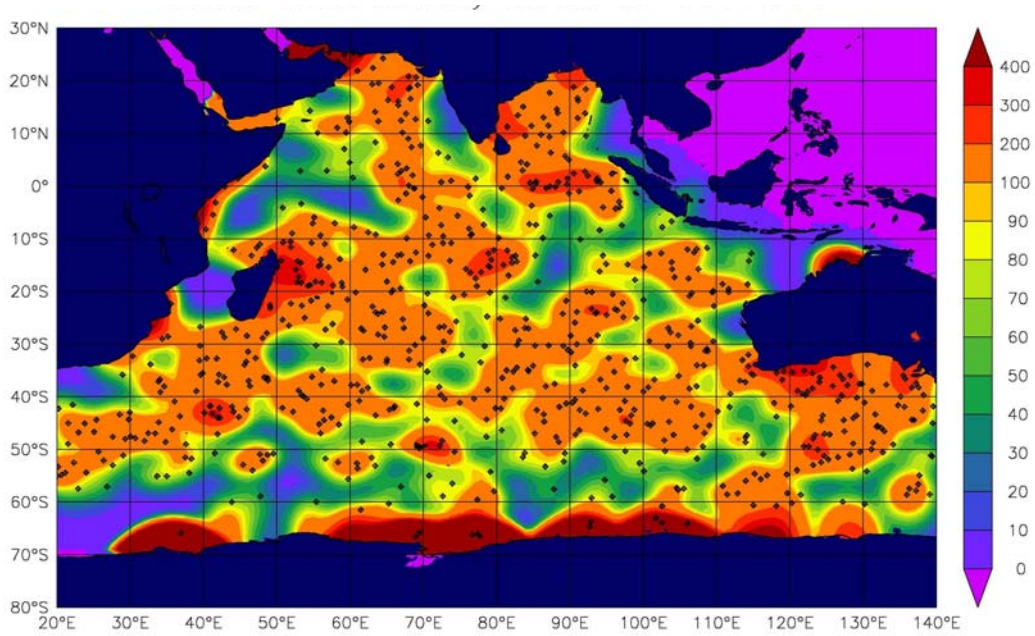
- Acquisition of Argo data from GDAC corresponding to floats other than deployed by India and made them available on INCOIS web site.
- Delayed Mode Quality Control
  (Refer 2.0 above)
- Data from the Indian Ocean regions are gridded into 1x1 box for monthly and 10 days and monthly intervals. These gridded data sets are made available through INCOIS Live Access Server (ILAS). Users can view and download data/images in their desired format. Two types of gridded products viz., Objectively Analyzed and Variational Analysis is generated and made available on LAS.
- Additionally SST from TMI, AMSRE and Wind from ASCAT, Chla from MODIS and OCM-2 are also made available on daily and monthly basis.
- Data Sets (CTD, XBT, Subsurface Moorings) are being acquired from many principle investigators. These data are being utilized for quality control of Argo profiles.
- Value added products:
  Two types of products are currently being made available to various user from INCOIS web site. They are:

  (i) Time series plots corresponding to each float (only for Indian floats). This include the following plots:
    - Water fall plots
    - Surface pressure
    - Bottom most pressure
    - Surface temperature
    - Bottom most temperature
    - Surface salinity
    - Bottom most salinity
    - Trajectory of float
    - T/S plots.

  (ii) Spatial plots using the objectively analysed from all the Argo floats data deployed in the Indian Ocean. This includes:
    - Temperature (at 0, 75, 100, 200, 500, 1000 meters)
    - Salinity (at 0, 75, 100, 200, 500, 1000 meters)
    - Geostrophic Currents (at 0, 75, 100, 200, 500, 1000 meters)
    - Mixed Layer Depth, Isothermal Layer Depth
    - Heat Content up to 300 mts
    - Depth of 20 deg and 26 deg isotherms

  These valued added products can be obtained from the following link http://www.incois.gov.in/Incois/argo/products/argo_frames.html

- Regional Co-ordination for Argo floats deployment plan for Indian Ocean. The float density in Indian Ocean as on 18 Oct, 2012 is shown below.



Publications:

1. Bhaskar, T. V. S. U., C. Jayaram, and E. P. Rama Rao, 2012: Comparison between Argo-derived sea surface temperature and microwave sea surface temperature in tropical Indian Ocean. *Remote Sensing Letters*, **1**-10.
2. Chatterjee, A., D. Shankar, S. Shenoi, G. Reddy, G. Michael, M. Ravichandran, V. Gopalkrishna, E. Rama Rao, T. Udaya Bhaskar, and V. Sanjeevan, 2012: A new atlas of temperature and salinity for the North Indian Ocean. *Journal of Earth System Science*, **121,** 559-593.
3. Prakash, S., T. M. B. Nair, T. V. S. U. Bhaskar, P. Prakash, and D. Gilbert, 2012: Oxycline variability in the central Arabian Sea: An Argo-oxygen study. *Journal of Sea Research*, **71,** 1-8.
4. Ravichandran, M., M. S. Girishkumar, and S. Riser, 2012: Observed variability of chlorophyll-a using Argo profiling floats in the southeastern Arabian Sea. *Deep Sea Research Part I: Oceanographic Research Papers*, **65,** 15-25.

1. Status

- **Data acquired from floats:** 151 floats were deployed in the Mediterranean and in Black Sea between 2000 and 2012 (Figure 1); 22 floats in 2012 (Figure 10).

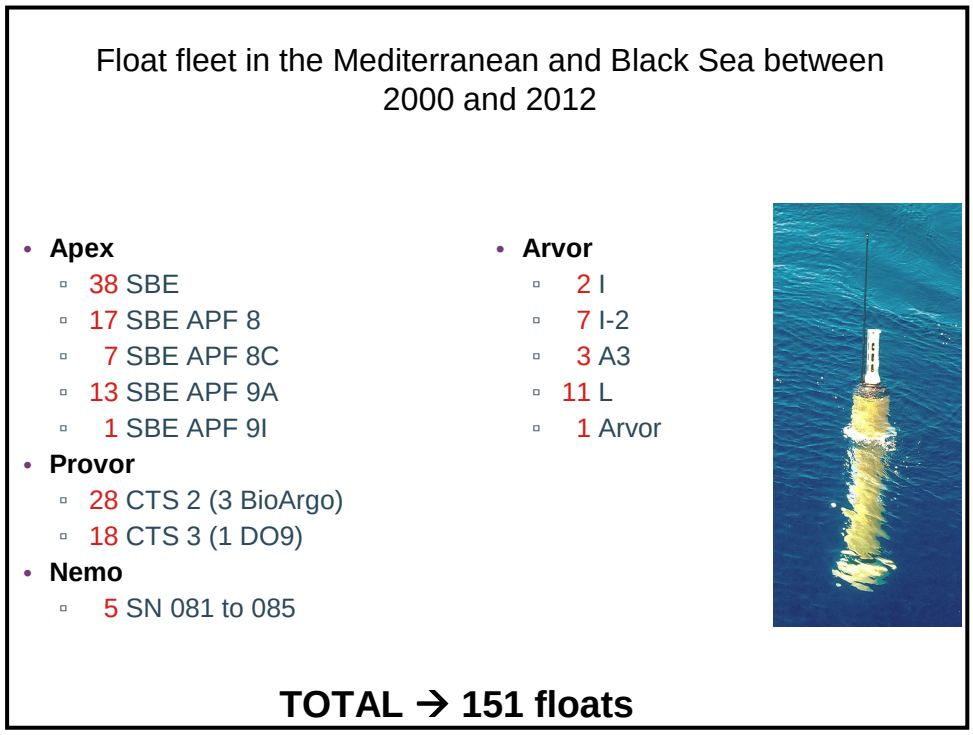


Figure 1. Floats deployed in the Mediterranean and Black Sea between 2000 and 2012.

- **Web pages:** The MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/) has been maintained and tables and graphics are updated in near real time. The floats deployed during 2012 are added to the web page as soon as the technical information are available. The float positions are plotted daily (Figure 2); the monthly and the whole trajectories are also provided (Figure 3). Links with the GDAC center (Coriolis) are also available for downloading both the real-time and delayed-mode float profiles.

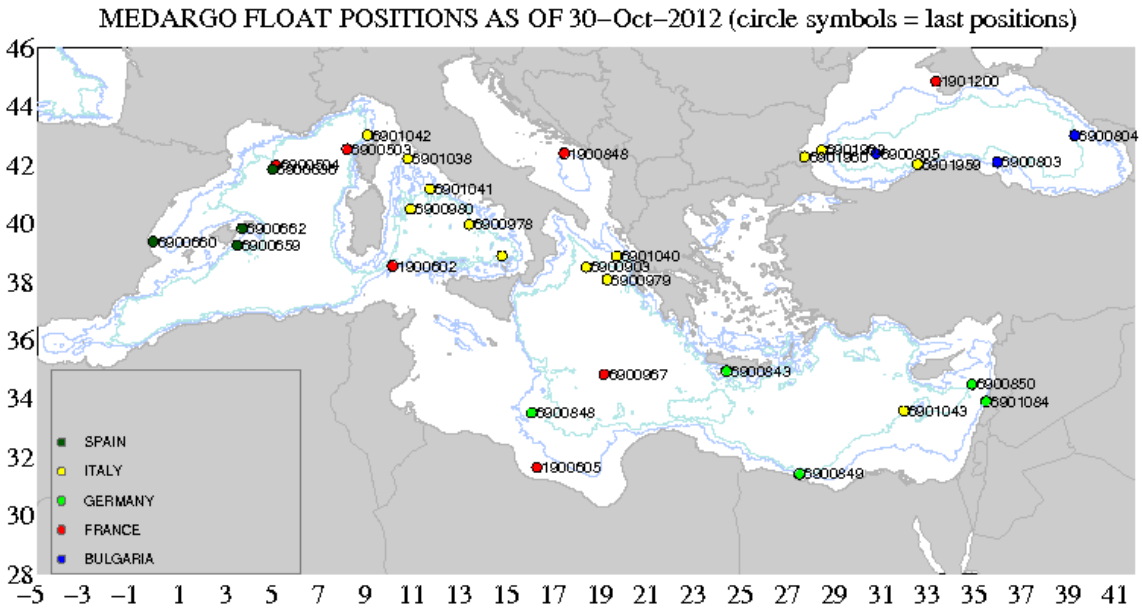


Figure 2. MedArgo float positions as of 26 October 2012 (updated daily).

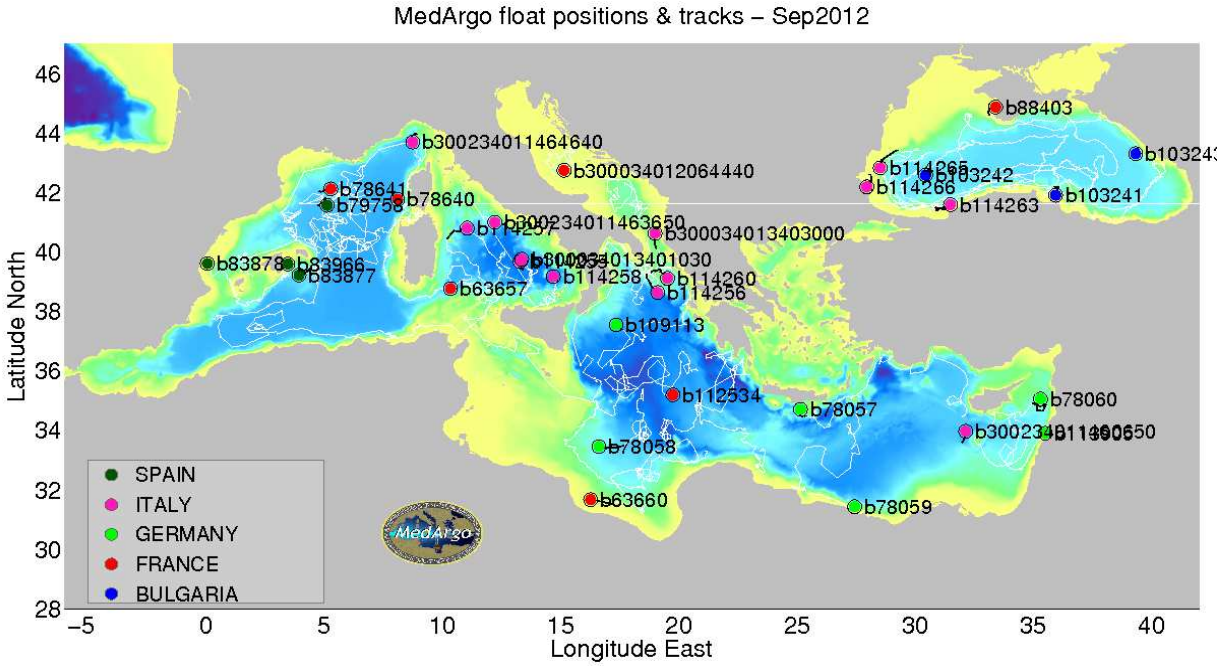


Figure 3. MedArgo float positions and tracks (September 2012). The monthly tracks are in black while the entire float trajectories are in white.

- **<u>Statistics of Argo data usage</u>:** (operational models, scientific applications, number of National Pis…):

    a. The Argo data in the Mediterranean have been used to study the thermohaline variability in Mediterranean sub-basins, work which can be

considered as a consistency test of the data in the areas considered. Ten years of Argo data combined with historical data collected mainly by ships are currently used to study temperature and salinity trends in the Ionian Sea (Figure 4).

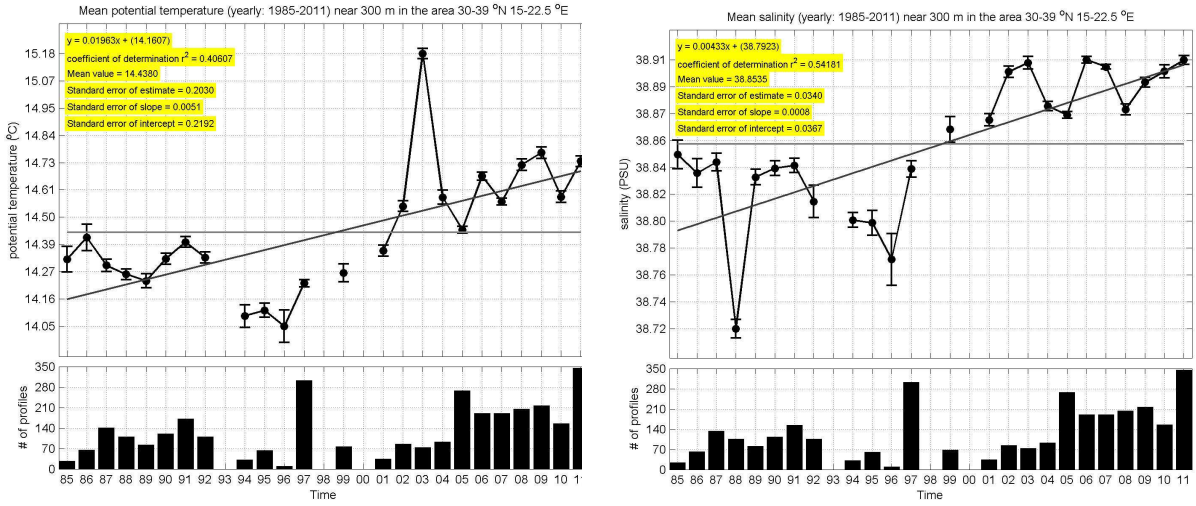


Figure 4. Trends in thermohaline properties in the deep Ionian Sea (1985-2011)

b. The study of the salt and mass transports and the sub-surface Mediterranean circulation at 350 m (Figure 5), are other examples of scientific applications of the Argo data.

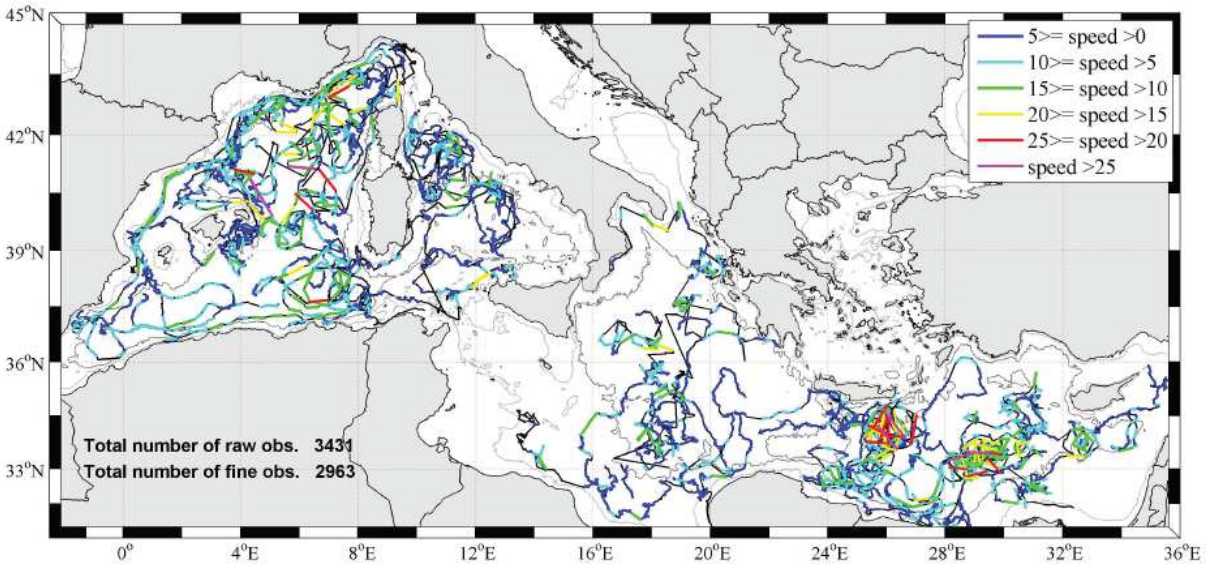


Figure 5. Sub-surface Mediterranean circulation at 350 m (Mediterranean intermediate circulation estimated from Argo data. Ocean Sci., 6, 331-343, 2010).

c. The MedArgo data are routinely assimilated in numerical forecasting models (MFS) (Figure 6).

- **<u>Products generated from Argo data</u>:**
  a. Daily maps of float positions (Figure 2)
  b. Monthly maps of float positions and track (Figure 3)
  c. Float data are assimilated in numerical forecasting models by INGV (MFS); daily and weekly maps of Mediterranean ocean forecasting system are produced (Figure 6).

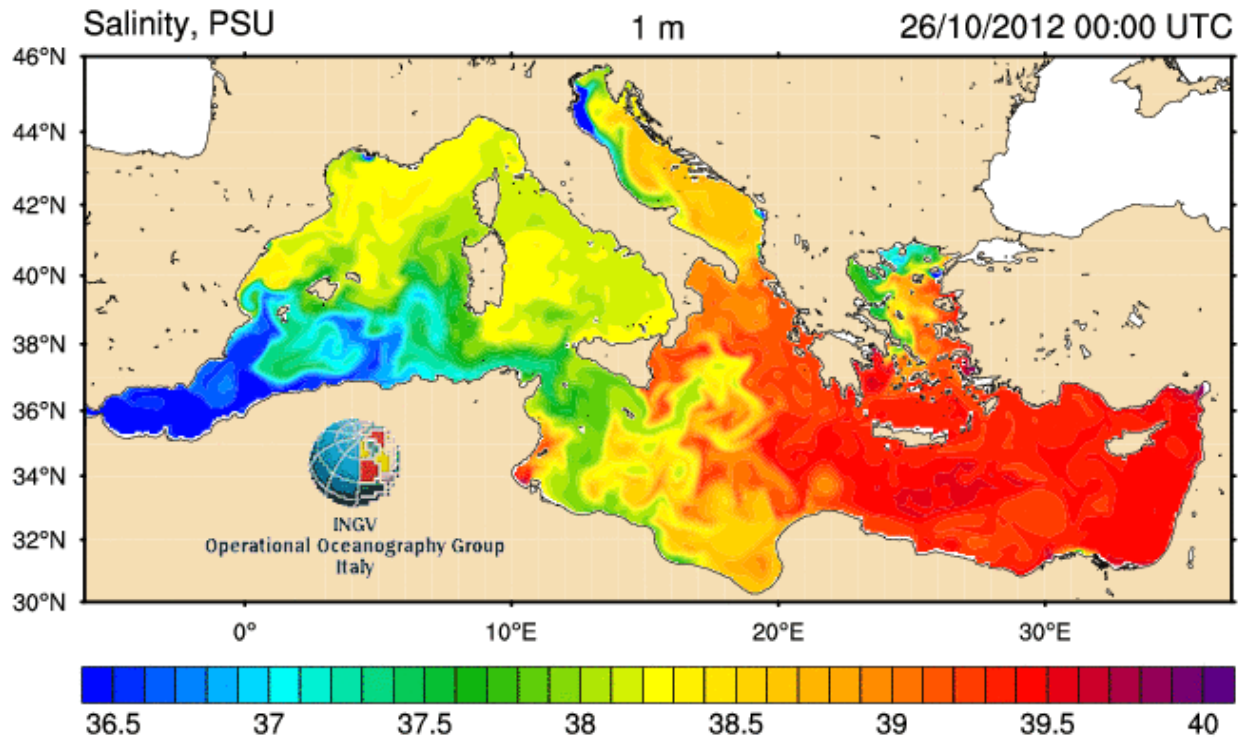


Figure 6. Daily mean forecasting model of salinity (1 meter deep).

2. Delayed Mode QC

OGS has continued to carry out the DMQC for the Argo data in the Mediterranean. Before the application of the DMQC, selected float profiles are qualitatively compared (in time and space) with the historical data (see example in Figure 7 and 8). Any possible surface pressure offsets were examined using the Metadata and Technical data files; different procedures were applied to correct this pressure offset depending on the float type, following the standard method proposed by the Argo community. In particular, for the Apex floats equipped with previous versions of Apf-9 controller the method was applied (in 2011)

and 5 floats were classified as Truncated Negative Pressure Drift (TNPD) in the Mediterranean Sea.

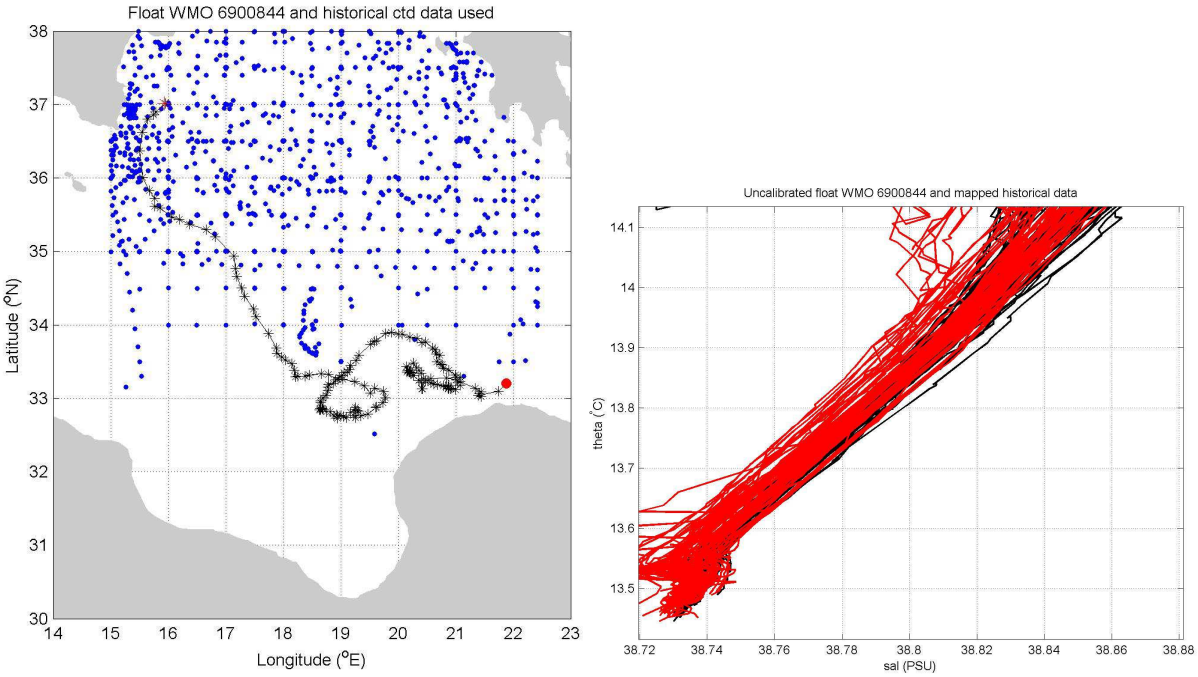


Figure 7. Location of float profiles (black stars; red star and dot are the deployment and last positions, respectively) and historical CTD data in blue (left panel) and float salinity profiles (black lines) and mapped historical data (red lines) in the most uniform part of the θ-S curve (right panel).

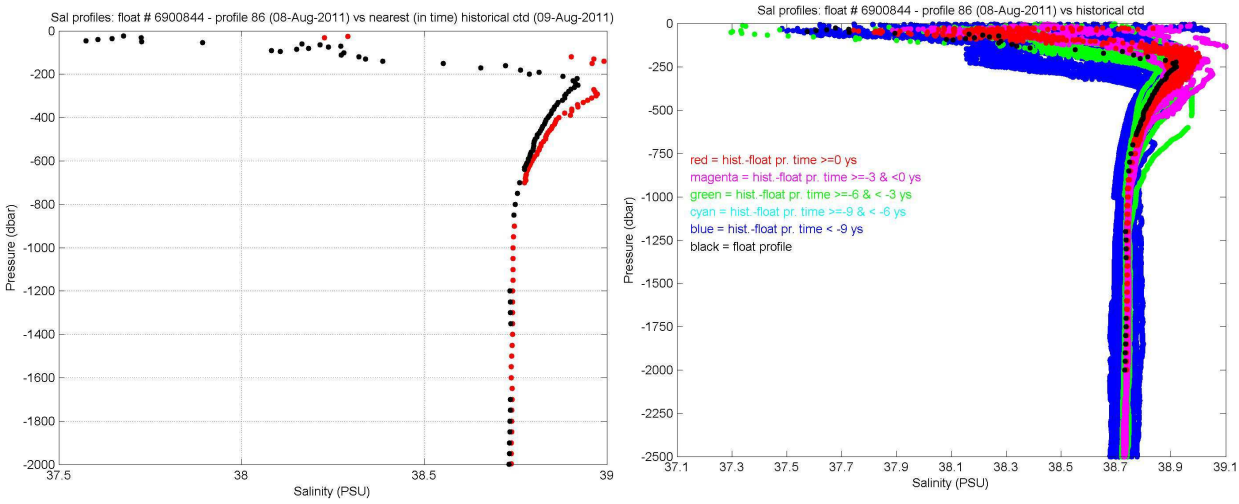


Figure 8. Selected float salinity profile (black dots) versus the nearest historical profile (left panel) and versus the historical data used to performed the DMQC (right panel). The float profile in the right panel is depicted in black while other colours represent the reference profiles.

Additional historical reference data for the Mediterranean have been recently uploaded and transformed in the correct format to be used by the DMQC procedure; moreover, some Argo reference data have been also added (Figure 9).

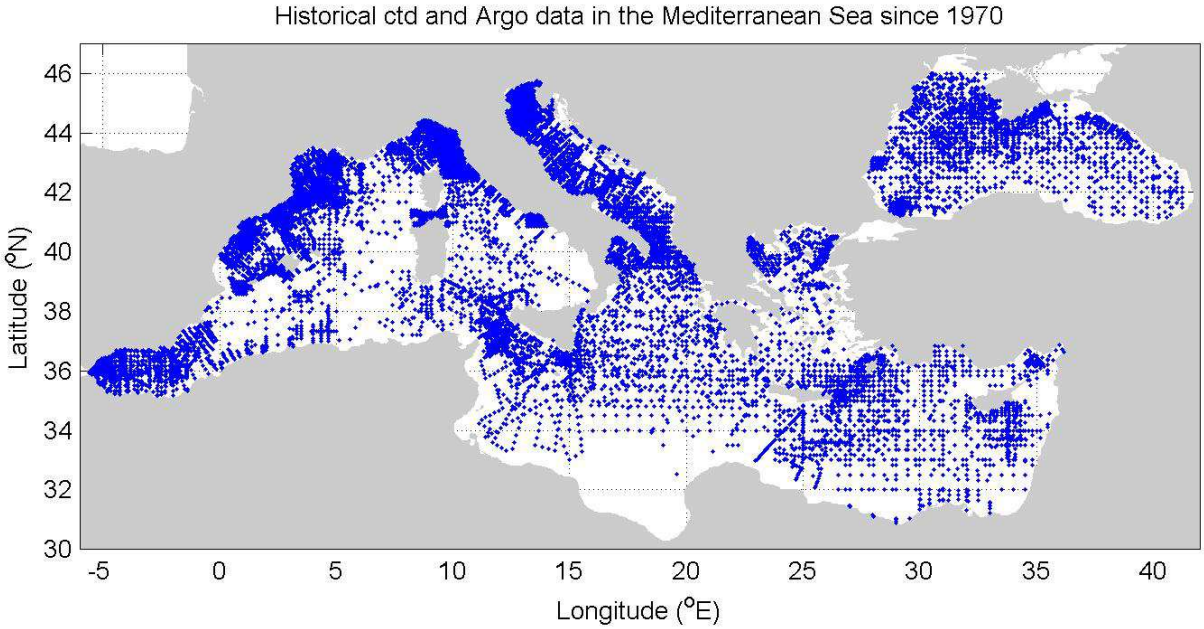


Figure 9. Location of the historical CTD and Argo data, spanning from 1970 to 2011, used in the DMQC.

The DMQC method has been applied to about 75% of the floats which died between 2000 and 2012 in the Mediterranean Sea: they were quality controlled in delayed-mode for salinity, temperature and surface pressure and the respective D-files were sent to GDAC (not all but about 65% of the D files have been already sent to the GDAC). So far, the majority of the DM checked floats, whose D files were sent to the GDAC, can be considered as well calibrated. The DMQC report of each float can be downloaded by the MedArgo web page (http://nettuno.ogs.trieste.it/sire/medargo/all/table_out_all.php).

3. Regional Centre Functions

MedArgo is the Argo Regional Centre for the Mediterranean and the Black Sea recognized officially in 2012. OGS, who coordinates the MedArgo activities, established several collaborations with European countries (Bulgaria, France, Spain, Greece, Germany) in order to set the planning and the deployment coordination of floats; these collaborations continued this year and will be extended also to Ukraine and Romania in 2013. Moreover, as part of these cooperations the float data are transferred in near real time to MedArgo and 22 new floats have been deployed in the Mediterranean and Black Sea during 2012 (Figure 10).

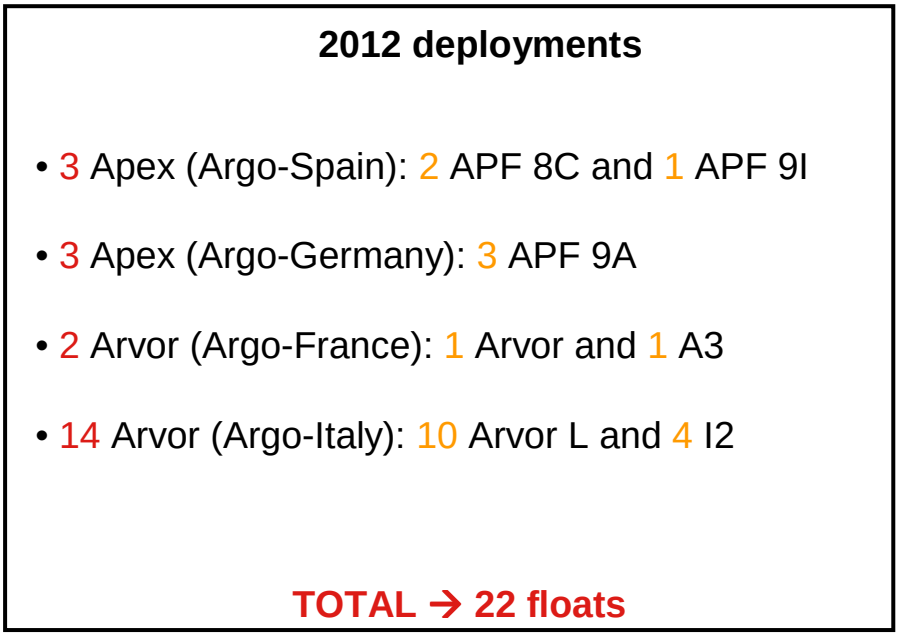


Figure 10. 2012 float deployments in the Mediterranean Sea

Three German floats were deployed in the Ionian Sea and Levantine sub-basin between April and June 2012. Three Spanish floats were deployed last summer close to the Balearic Islands. Two French Arvor models are operating since March in the Ionian Sea. Italy deployed 14 units: 3 floats in the Black Sea and 11 in the Mediterranean Sea (Tyrrhenian and Ionian Sea and Levantine sub-basin); 10 units were Arvor-L models and 4 were Arvor I2 (Iridium).

There are 28 active Argo floats in the Mediterranean Sea and 7 in the Black Sea as of November 2012.

About 40 floats will be deployed in 2013 (Figure 11): 33 in the Mediterranean Sea and 7 in the Black Sea, including the contributions of many countries. Many countries will give their contribute and it is expected that the total number of floats will be approximately around 80 units (including about 20 floats equipped with biogeochemical sensors), that is double with respect to the conservative minimal density recommended in EuroArgo PP and about double with respect to the global Argo density.

Figure 11. Deployments plans for 2013.

Argo National Data Management Report of Japan, 2012

1. Status

The Japan DAC, the Japan Meteorological Agency (JMA), has processed data from 1144 Argo and Argo-equivalent floats including 271 active floats as of October 15, 2012. There are ten Japanese PIs who agreed to provide data to the international Argo data management. The DAC is acquiring ARGOS messages from CLS and getting IRIDIUM messages via e-mail in real-time, thanks to the understanding and the cooperation of PIs. Almost all profiles from those floats are transmitted to GDACs in netCDF format and issued to GTS using TESAC and BUFR code after real-time QC on an operational basis. The Okinawa Institute of Science and Technology deployed a NOVA float in March 2012. The profiles will be transmitted to GDACs and GTS, when the WMO instrument code of NOVA is decided.

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) has done the Delayed Mode QC for all Japanese floats. JAMSTEC acquired the ARGOS messages for 12,498 profiles via CLS and the Iridium messages via e-mail and dial-up access for delayed QC from October 26th, 2011 to October 13th, 2012. JAMSTEC sent 8,281 delayed profile files (D-files) to GDACs through the Japan DAC, JMA, during the period. Submission of delayed profile files were slowed down during the last year because we have been upgrading our analysis system since the last fall. Since the new analysis system will be completed by the next spring, we are trying to get the submission rate normal.

Web pages:

Japan Argo

http://www.jamstec.go.jp/J-ARGO/index_e.html

This site is the portal of Japan Argo program. The outline of Japanese approach on the Argo program, the list of the publication, and the link to the database site and PIs, etc. are being offered.

Real-time Database (JMA)

http://argo.kishou.go.jp/index.html

This site shows global float coverage, global profiles based on GTS TESAC and BUFR messages, and status of the Japanese floats. JMA started providing the monthly mean sub-surface temperature distributions in the Pacific Ocean from 2001 to the latest, which are objectively analyzed using in-situ temperature data including those from Argo floats.

Delayed mode Database (Argo JAMSTEC)

http://www.jamstec.go.jp/ARGO/argo_web/argo/index_e.html

JAMSTEC's website shows mainly Japanese float list, trajectory map, profile chart, and QCed float data. Moreover, the position and trajectory maps of all floats of the world as well as Japanese floats by using Google Map. Brief profile figures of the selected floats are also shown. This site also shows global maps based on objective analysis (temperature, salinity, potential density, dynamic height, geostrophic current, mixed layer depth, etc.).

Statistics of Argo data usage:

Operational models of JMA

MOVE/MRI.COM-G (Multivariate Ocean Variation Estimation System/ Meteorological Research Institute Community Ocean Model - Global)

JMA has been operating the MOVE/MRI.COM-G for the monitoring of El Niño and the Southern Oscillation (ENSO) and for initialization of the seasonal prediction model (JMA/MRI-CGCM). The MOVE/MRI.COM-G consists of an ocean general circulation model (OGCM) and an objective analysis scheme.
Visit
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/move_mricom_doc.html
for more information.

JMA/MRI-CGCM (Coupled ocean-atmosphere General Circulation Model of JMA)

JMA has been operating JMA/MRI-CGCM as a seasonal prediction model and an ENSO prediction model. The oceanic part of this model is identical to the OGCM used for the MOVE/MRI.COM-G.
Visit
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/jmamri_cgcm_doc.html
for more information.

MOVE/MRI.COM-WNP (Multivariate Ocean Variation Estimation System/ Meteorological Research Institute Community Ocean Model - Western North Pacific)

MOVE/MRI.COM-WNP provides daily and monthly products of subsurface temperatures and currents for the seas around Japan and northwestern Pacific Ocean.

Other operational models

JCOPE2 (Japan Coastal Ocean Predictability Experiment)

JCOPE2 is the model for prediction of the oceanic variation around Japan which is operated by Research Institute for Global Change of JAMSTEC. JCOPE2 is the second version of JCOPE, developed with enhanced model and data assimilation schemes. The Argo data is used by way of GTSPP. The hindcast data 6 months back and the forecast data 3 months ahead are disclosed on the following web site: http://www.jamstec.go.jp/frcgc/jcope/. More information are shown in
http://www.jamstec.go.jp/frcgc/jcope/htdocs/jcope_system_description.html.

FRA-JCOPE2

FRA-JCOPE2 is the reanalysis data created by assimilating most available observation data into the JCOPE2 ocean forecast system. The horizontal high resolution is 1/12 deg. in order to describe the oceanic variability associated with the Kuroshio-Kuroshio Extension, the Oyashio, and the

mesoscale eddies from January 1993 to December 2009. Collaboration with Japanese Fishery Research Agency (FRA) has allowed us to assimilated huge amount of in-situ data around Japan. FRA-JCOPE2 reanalysis data are available. The website, http://www.jamstec.go.jp/frcgc/jcope/vwp/, provides information about downloading and interactively visualizing the reanalysis data for users.

FRA-ROMS

FRA-ROMS is the nowcast and forecast system for the Western North Pacific Ocean developed by Fisheries Research Agency (FRA) based on the Regional Ocean Modeling System (ROMS). FRA started the operation in May 2012. The forecast oceanographic fields are provided every week on the website http://fm.dc.affrc.go.jp/fra-roms/index.html/.

Products generated from Argo data:

Products of JMA

El Niño Monitoring and Outlook

JMA issues the current diagnosis and the outlook for six months of ENSO on the following web site. The outputs of the MOVE/MRI.COM-G and the JMA/MRI-CGCM can be found here.
http://ds.data.jma.go.jp/tcc/tcc/products/elnino/index.html

Subsurface Temperatures and Surface Currents in the seas around Japan

The following parameter outputs of the MOVE/MRI.COM-WNP can be found on http://goos.kishou.go.jp/rrtdb/jma-pro.html.

- Daily and Monthly mean subsurface temperatures at the depths of 50m, 100m, 200m and 400m analyzed for 0.1 x 0.1 degree grid points.
- Daily Surface Currents for 0.1 x 0.1 degree grid points.

Products of JAMSTEC

MOAA (Monthly Objective Analysis using the Argo data)

MOAA is the global GPV data set which was made by monthly OI objective analysis using Argo and the other available CTD and morring data. Various maps have been made using MOAA, and opened to the public on the Argo JAMSTEC web site,
http://www.jamstec.go.jp/ARGO/argo_web/MapQ/Mapdataset_e.html.
We will release the new data set, which is operated a 10-day global ocean analysis by optimal interpolation based on Argo, TRITON and available CTD data in the near future.

Objectively mapped velocity data at 1000 dbar derived from trajectories of Argo floats

The gridded velocity data at 1000 dbar is made by optimal interpolation analysis using YoMaHa’07. This dataset has been disclosed since October

2009. This dataset are updated every 6 months. This data is opened to the public on the Argo JAMSTEC web site, http://www.jamstec.go.jp/ARGO/argo_web/G-YoMaHa/index_e.html.

Mixed layer data set from Argo floats in the global ocean

JAMSTEC has produced a data set of gridded mixed layer depth with its related parameters, named MILA GPV. This consists of 10-day and monthly average data and monthly climatology data in the global ocean using Argo temperature and salinity profiles. This data set is opened to the public on the Argo JAMSTEC web site, http://www.jamstec.go.jp/ARGO/argo_web/MILAGPV/index_e.html.

2. Delayed Mode QC

Based on the mutual agreement by PIs in Japan in 2006, JAMSTEC has done the DMQC for all Japanese floats.
JAMSTEC has submitted the delayed mode files of 84,004 profiles to GDACs as of October 17th, 2012.
The procedure of DMQC in JAMSTEC is as follows.

(JAMSTEC floats and the most of Argo-equivalent floats)

1. (within 10 days) data re-acquisition from CLS, bit-error repair (if possible), real-time processing, position QC, visual QC
2. (within 180 days) surface pressure offset correction, cell TM correction (Apex only)
3. (after 180 days) WJO and OW salinity correction, the definitive judgement by experts, D-netCDF file making

(Argo-equivalent floats that had ceased by 2007)

JMA executes real-time processing again by using the latest procedure. The procedure after real-time processing is executed by JAMSTEC according to the same way as the foregoing.

The OW software is mainly operated instead of WJO. The calculation result of WJO has been used at the definitive judgment. In order to decide the best parameter value, JAMSTEC will continue to use both OW and WJO.

3. GDAC Functions

The JAMSTEC ftp server has been providing the mirror site of GDACs since 2003.
ftp://ftp2.jamstec.go.jp/pub/argo/ifremer/
ftp://ftp2.jmastec.go.jp/pub/argo/fnmoc/

4. Regional Centre Functions

JAMSTEC operates PARC in cooperation with IPRC and CSIRO and has extended

the responsible region into the whole Pacific including the Southern Ocean by request of AST-9 (Action item 9) since April 2008.
JAMSTEC is providing the float monitoring information in the Pacific region (e.g., float activity watch, QC status, anomaly from objective analysis, diagnosis plot for sensor correction, etc.), reference data set for DMQC (SeHyD and IOHB), the link to the CTD data disclosure site of Japanese PIs, some documents, and some QC tools on the following web pages (http://www.jamstec.go.jp/ARGORC/). JAMSTEC will plan to upgrade of the site which provides the float monitoring information.

UK Argo national data management report 2012

Justin Buck (BODC), Clare Davis (BODC)

Status

Staff changes

At the start of 2012 Sam Jones (UK Argo real time operator of 2 years) moved to SAMS in Oban to start a PhD. Sam had become competent on Argo matters so obviously left a void in is his wake. We rapidly recruited Clare Davis in his place. Clare has just come from a PhD in phosphate chemistry which seemed to compliment the move in Argo to measure new parameters. In addition to the real time processing eventually Clare will also share the UK delayed mode workload.

Funding

Data management work at BODC has been funded from a combination of core 'National Capability' and Oceans 2025 thematic programme by the Natural Environment Research Council. This is complimented with funding from the European Union (EU). The EU Euro Argo funding has several projects:

- Strengthening the International Dimension of the Euro Argo Research Infrastructure (SIDERI) which has been funding trajectory, near-surface temperature and will cover delayed mode processing cookbook activities in the coming year.
- Argo Improvements for the GMES Marine Service (E-AIMS) where funding will commence next year. This has an emphasis on biogeochemical sensors and new communications systems.

Acquisition and implementation of additional float technologies

Biogeochemical sensors and Iridium communications

In early 2012 an under-spend was identified by the Department for Energy and Climate Change which was allocated to funding floats to support the Natural Environment Research Council (NERC) Arctic programme. The money funded the purchase of 4 floats with additional oxygen optode, WetLabs FLBB combined fluorometer/backscatter sensors, and Iridium communications. In addition to these 9 further floats with standard core mission sensors and Iridium were purchased. These were deployed in the summer of 2012 in the Lofoten Basin, Norwegian Basin and Greenland Basin. Luckily, the first batch of these deployments were perfectly timed to coincide with the onset of the spring bloom.

The data processing for both of these new technologies has been the focus of much of the Argo resource at BODC this year. Real time data processing was operational within two months of the first Iridium deployment and once the latest format versions are cleared at USGODAE we are ready to send the full data from all of these floats to the GDACs in real time. We would like to take this opportunity to thank all the people that helped with information and advice when working on this; in particular but not exclusively Anne Thresher (CSIRO), Dana Swift (UW), Dave Stahlke (WetLabs) and Yann Bernard (CLS). It is hoped that delayed mode processing on these floats will begin next year.

E-AIMS project

The European Union funded Euro-Argo Improvements for the GMES Marine Service (E-AIMS) proposal was successful and funding will commence in early 2013. This project will part fund four floats: two with biogeochemical sensors and two with either Iridium or ARGOS-3 communications, all will be processed via BODC. Plymouth Marine Laboratory will be involved in the analysis/assessment of data from the floats with bio-optical sensors, which are planned to be deployed along the Atlantic Meridional Transect line.

Near surface temperature data

BODC have continued to collaborate with the UK Met Office on defining standards for the near surface un-pumped temperature data. Fiona Carse (Met Office) has also been working on assessing the measurements and the utility of the additional data.

The coverage of near-surface-temperature (NST) has continued to improve with contributions from APEX floats with un-pumped NST measurements, PROVOR floats with un-pumped NST measurements, and SOLO-II floats that stop pumped measurements at 1 dBar (rather than 5 dBar) all contributing to the dataset. In addition, STS sensor modules have been fitted to some of the newer APEX floats which record near surface salinity and temperature via a freely-flushing auxiliary module fixed to the float.

A map of near-surface-temperature data coverage coloured by the magnitude of near-surface temperature difference in the top 10 dBar of the water column is shown in Figure 1.

Figure 1: Locations of near surface temperature profiles with profiles showing significant surface temperature gradient shown in colour. This plot does not include data from STS floats.

The 345 Argo NST profiles with significant ΔT_{10} were compared to the Met Office OSTIA (Operational Sea Surface Temperature and Sea Ice Analysis) SST products (Donlon et al., 2012); OSTIA provides daily gridded SST_{fnd} values at 1/20° resolution. OSTIA is corrected for diurnal warming.

The 0-1 dbar Argo NST is consistently warmer than the OSTIA SST_{fnd}, whilst at 4-5 dbar the Argo NST are slightly cooler. Figure 2 suggests an 'equivalence depth' between Argo NST and OSTIA of approximately 4 dbar. This is close to the value of 3 metres, below which it is generally assumed there is no effect of diurnal warming (Takaya et al., 2010). This result further highlights the potential value of the NST data.

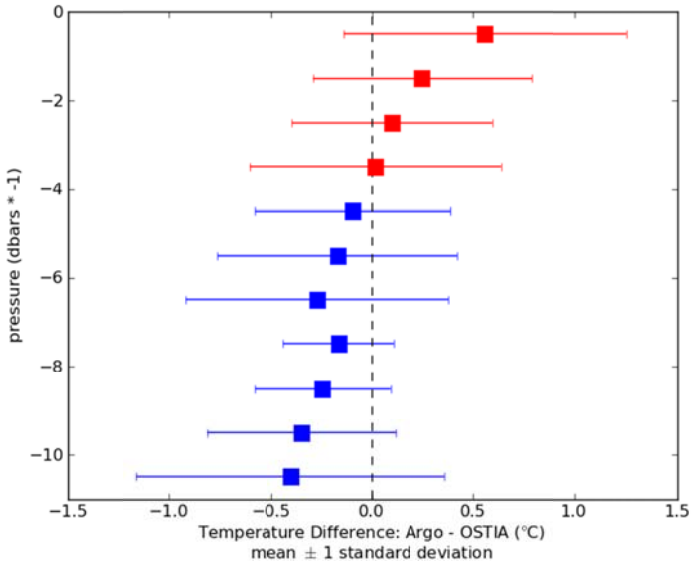


Figure 2: Mean temperature difference between Argo and OSTIA SST with standard deviations. This plot does not include data from STS floats.

BODC will continue to collaborate with other NST groups and make a proposal for real-time QC of NST data at ADMT13. A summary of our recommendations thus far is given in Table 1 which will be the basis for discussion at the meeting.

Table 1: Table describing modifications needed to real time quality control tests for near surface Argo data.

Test	Modification	Comment
Platform identification	None	Already applied in routine QC of the primary core mission profile
Impossible date	None	Already applied in routine QC of the primary core mission profile
Impossible location	None	Already applied in routine QC of the primary core mission profile
Position on land	None	Already applied in routine QC of the primary core mission profile
Impossible speed	None	Already applied in routine QC of the primary core mission profile
Global range	None	
Regional range	None	
Pressure increasing	None	
Spike	None	
Top and bottom spike	None	obsolete test anyway
Gradient	None	Figure 2 shows 9 °C threshold is unlikely to be triggered so no change needed to test
Digit rollover	None	
Stuck value	None	

Density inversion	drop test	Drop this test for near surface data (<5 dBar depth).
Grey list	None	No changes but, new parameters need to be communicated to operational centres so they understand the measurements.
Gross salinity or temperature sensor drift	drop test	Drop this test for un-pumped SST values, 1 °C threshold will be triggered in this data frequently because the un-pumped data is shallow and 1 °C is within the one standard deviation bar in Figure 2.
Visual QC	None	
Frozen profile	None	
Deepest pressure	None	

Trajectory data progress

Another focus for BODC efforts this year has been on the improvements to the quality of trajectory data. Our original database of cycle timings and non-spatial event times has been dropped and we are in the process of rebuilding this. This is leading to significant improvements to data hosted by BODC including:

- Derivation of non-spatial event times and transmission times in a manner that is internationally consistent
- Recalculation of all ascent end times to the current international standard
- Derivation of transmission end times (TET) using the method described by Park *et al.*(example shown in Figure 3)

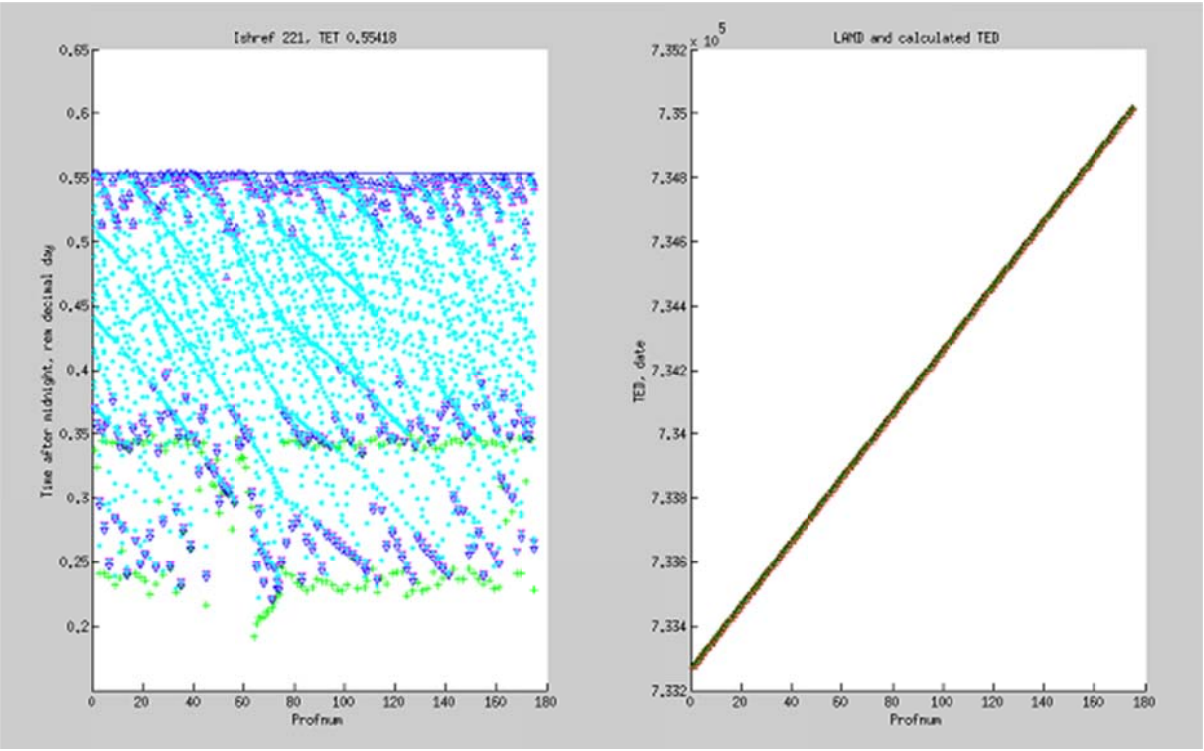


Figure 3: Example TET diagnostic plot for the float with WMO 6900604 showing TET derivation for the float with the date via the Last Argo Message Date (LAMD).

We have also contributed to the cookbook describing trajectory data processing and sourced answers to some of the unclear behaviours in the cycle timings and sub-surface trajectories in APEX floats. It has become clear that some aspects such as the end of park to start of profile for older APF7 and APF8 APEX floats may never be fully understood as the float source code does not exist anymore.

Data acquired from floats

Data from all UK floats are received at BODC by automatic download from the CLS database every 12 hours. Table 1 summarises the deployments and data received according to float form. BODC endeavours to set up floats for distribution of data to GTS and GDACS within a week of deployment. BODC also handles data from Irish, Mauritian and Saudi Arabian floats.

Table 2: A summary of float deployments and data acquired from floats managed by BODC in the year preceding 1st October 2012 according to float type and Country.

Float Type	Deployment by country			Number of profiles
	UK	Mauritius	Ireland	
APEX APF9a				566
APEX APF9a - ice detection	9			245
APEX APF9a – near surface temperature	31	2		2071
APEX APF7a/APF8a				1738
APEX APF7a/APF8a – ice detection				148
APEX APF9i – ice detection	9			67
APEX APF9i – biogeochemical sensors	4			34
NKE ARVOR			2	80
Totals	53	2	2	4949

Data issued to GTS

Data from all UK floats are sent to the GTS every 12 hours. Almost 100% of TESACs messages are available within 24 hours. Occasional disruptions occurred due to email server failures and server problems.

In summer 2012 there was an initial delay of 1-2 months setting up our system to process data from Iridium floats. Processing of data from Iridium floats is now operational and we do not expect further delays. This delay did not impact of forwarding of data that use ARGOS communications.

Data issued to GDACs after real-time QC

All UK data received at BODC are passed through the agreed real-time quality control tests within one hour of the data arriving at BODC. All data that have been processed at BODC are queued for transfer to both GDACs which occurs twice a day. Any file that fails to be transferred is queued for the next transfer attempt.

Data issued for delayed QC

All delayed QC on BODC hosted floats is done within BODC.

Delayed mode QC with start at the end of 2012; the workload created by floats with new sensors/ Iridium communications and training of new staff moved the date we can start delayed mode QC this year.

The OW software is being used at BODC with latest reference data available from Coriolis (CTD climatology and Argo profile climatology for guidance). 94.4% of UK floats profiles eligible for delayed mode QC have been processed ad submitted to the GDACs in D-mode.

Web pages

BODC hosts the main data information and access pages for the UK. These pages include a list of the current status of all deployed UK floats, automatic request system for UK float data, links to both GDACs and other Argo related sites and an interactive map giving information on last known positions, deployment positions and direct links to profile plots of each float's most recent profile reported. There is also information on the history of Argo and how float technology has been and continues to be developed. There are also pages promoting knowledge transfer and the use of Argo-generated data for education, operational analysis and research.

Statistics on Argo data usage

In addition to the GDACs, BODC data are also made available through the UK Argo Data Centre website via an interactive map interface. During the last year, UK Argo metadata, trajectory and profile files have been provided to users through the BODC website. BODC has handled 24 requests made by 21 users from 9 countries.

Operational and scientific use of Argo data at the Met Office

Operational ocean forecasting

All Argo data (alongside other in-situ and remotely sensed ocean data) are routinely assimilated into the Forecasting Ocean Assimilation Model (FOAM) operational ocean forecasting system run by the Met Office National Centre for Ocean Forecasting (NCOF).

Seasonal to decadal prediction

Argo data are also in the GloSea (Global Seasonal) coupled model run to make seasonal forecasts for several months ahead. On longer timescales, the Hadley Centre DePreSys (Decadal Prediction System) is being developed for climate predictions on decadal timescales. Idealised model experiments have shown that sub-surface data, such as Argo data, are necessary to provide plausible predictions.

Climate monitoring and prediction

The Hadley Centre maintains the HadGOA (sub-surface global analysis) dataset of historical temperature and salinity. Variables are on a 2-degree grid and computed on a number of fixed isotherms and fixed depths at monthly resolution. The dataset includes available Argo data and will include near real-time updates using Argo data. The dataset is used for global ocean heat content analysis.

Products generated from Argo data

None specifically generated from only Argo data.

Scientific use of the data within NERC and the academic community

A basic citation search indicated that 13 research papers that directly used Argo data were published in 6 different journals in 2011-2012 with UK authors.

Turbulent nutrient fluxes in the Iceland Basin Original Research Article

Deep Sea Research Part I: Oceanographic Research Papers, Volume 63, May 2012, Pages 20-35

A. Forryan, A.P. Martin, M.A. Srokosz, E.E. Popova, S.C. Painter, M.C. Stinchcombe

Fronts and habitat zones in the Scotia Sea Original Research Article

Deep Sea Research Part II: Topical Studies in Oceanography, Volumes 59–60, January 2012, Pages 14-24

Hugh Venables, Michael P. Meredith, Angus Atkinson, Peter Ward

Mechanisms of subantarctic mode water upwelling in a hybrid-coordinate global GCM Original Research Article

Ocean Modelling, Volumes 45–46, 2012, Pages 59-80

Hao Zuo, Alberto C. Naveira Garabato, Adrian L. New, Andreas Oschlies

Terrestrial waters and sea level variations on interannual time scale Original Research Article

Global and Planetary Change, Volume 75, Issues 1–2, January 2011, Pages 76-82

W. Llovel, M. Becker, A. Cazenave, S. Jevrejeva, R. Alkama, B. Decharme, H. Douville, M. Ablain, B. Beckley

Seasonal to interannual phytoplankton response to physical processes in the Mediterranean Sea from satellite observations Original Research Article

Remote Sensing of Environment, Volume 117, 15 February 2012, Pages 223-235

Gianluca Volpe, Bruno Buongiorno Nardelli, Paolo Cipollini, Rosalia Santoleri, Ian S. Robinson

Seasonal evolution of the upper-ocean adjacent to the South Orkney Islands, Southern Ocean: Results from a "lazy biological mooring" Original Research Article

Deep Sea Research Part II: Topical Studies in Oceanography, Volume 58, Issues 13–16, July–August 2011, Pages 1569-1579

Michael P. Meredith, Keith W. Nicholls, Ian A. Renfrew, Lars Boehme, Martin Biuw, Mike Fedak

The observed signature of mesoscale eddies in sea surface temperature and the associated heat transport Original Research Article

Deep Sea Research Part I: Oceanographic Research Papers, In Press, Accepted Manuscript, Available online 30 August 2012

Ute Hausmann, Arnaud Czaja

2.16 - Measurement Technologies: Measure What, Where, Why, and How?

Treatise on Estuarine and Coastal Science, Volume 2, 2011, Pages 361-394

A.J. Souza, R. Bolaños, J. Wolf, D. Prandle

Food web structure and bioregions in the Scotia Sea: A seasonal synthesis Original Research Article

Deep Sea Research Part II: Topical Studies in Oceanography, Volumes 59–60, January 2012, Pages 253-266

Peter Ward, Angus Atkinson, Hugh J. Venables, Geraint A. Tarling, Mick J. Whitehouse, Sophie Fielding, Martin A. Collins, Rebecca Korb, Andrew Black, Gabriele Stowasser, Katrin Schmidt, Sally E. Thorpe, Peter Enderlein

Closing the loop – Approaches to monitoring the state of the Arctic Mediterranean during the International Polar Year 2007–2008 Original Research Article

Progress in Oceanography, Volume 90, Issues 1–4, July–September 2011, Pages 62-89

C. Mauritzen, E. Hansen, M. Andersson, B. Berx, A. Beszczynska-Möller, I. Burud, K.H. Christensen, J. Debernard, L. de Steur, P. Dodd, S. Gerland, Ø. Godøy, B. Hansen, S. Hudson, F. Høydalsvik, R. Ingvaldsen, P.E. Isachsen, Y. Kasajima, I. Koszalka, K.M. Kovacs, et al.

Assimilation impacts on Arctic Ocean circulation, heat and freshwater budgets Original Research Article

Ocean Modelling, Volume 40, Issue 2, 2011, Pages 147-163

Hao Zuo, Ruth I. Mugford, Keith Haines, Gregory C. Smith

Group for High Resolution Sea SurfaceTtemperature (GHRSST) analysis fields inter-comparisons: Part 1. A GHRSST multi-product ensemble (GMPE)

Deep-Sea Research II, Volumes 77–80, 15 November 2012, Pages 21–30

Matthew Martin, Prasanjit Dash, Alexander Ignatov, Viva Banzon,Helen Beggs, Bruce Brasnett, Jean-Francois Cayula, James Cummings, Craig Donlon, Chelle Gentemann, Robert Grumbine, Shiro Ishizaki, Eileen Maturi, Richard W. Reynolds and Jonah Roberts-Jones,

Group for High Resolution Sea Surface Temperature (GHRSST) analysis fields inter-comparisons—Part 2: Near real time web-based level 4 SST Quality Monitor (L4-SQUAM) Original Research Article

Deep Sea Research Part II: Topical Studies in Oceanography, Volumes 77–80, 15 November 2012, Pages 31-43

Prasanjit Dash, Alexander Ignatov, Matthew Martin, Craig Donlon, Bruce Brasnett, Richard W. Reynolds, Viva Banzon, Helen Beggs, Jean-Francois Cayula, Yi Chao, Robert Grumbine, Eileen Maturi, Andy Harris, Jonathan Mittaz, John Sapper, Toshio M. Chin, Jorge Vazquez-Cuervo, Edward M. Armstrong, Chelle Gentemann, James Cummings, et al.

Regional centre activity

Four organizations participate in the Southern Ocean Argo Regional Centre - BODC (Atlantic Ocean Sector), CSIRO (“Australian sector”), JAMSTEC (Pacific Ocean Sector) and the University of Washington (Indian Ocean Sector).

BODC hosts the main data and information web pages. These pages contain an animation of the Forecast Ocean Assimilation Model (FOAM) outputs (potential temperature, salinity and velocity at

five metres and 995.5 m) and an interactive map giving information on last known positions, deployment positions and direct links to both GDACs ftp sites.

Re-establishing a link to submit profiles to CCDHO is on-going and the aim at BODC is to automate delivery. The goal is for these to filter through to the Argo delayed-mode QC reference data. It is still hoped ease this restriction in due course. The routine submission of CTD profiles to CCHDO when they are banked at BODC is the eventual goal, negotiations are complete and just the technical development is required to make this operational.

Partnership for Observation of the Global Oceans (POGO) work has continued with development of routines to automate the collection and submission of cruise plans to POGO. This effort has been enhanced in Europe due to the EU-funded EUROFLEETS project. The SIDERI project is also looking to use POGO to collect research vessel itineraries for the purpose of cruise planning. This is semi-automatic for the US University-National Oceanographic Laboratory System (UNOLS) managed ships whilst the data are publicly accessible. It is hoped to extend this method of collection of data to UK and German research vessels next.

Argo National Data Management Report of United States

13th Argo Data Management meeting

October 1st 2011 – September 30th 2012

1. Status

Data acquired from floats deployed during:
a) October 1st 2011 – September 30th 2012
Floats deployed: 429
Floats reporting: 364
Floats not reporting for more than 30 days: 65
Profiles quality controlled: 72,709

b) 1997 to September 30th , 2012
Floats deployed: 4,477
Floats reporting: 1,816
Floats not reporting for more than 30 days: 2,390
Floats failed on launch: 113
Profiles quality controlled: 473,990

Data issued to GTS:
During the reporting period, the US DAC distributed 61,097 profiles on GTS. About 82% of profiles were available in less than 24 hours and 93% in less than 36 hours.

The US DAC sent 63,429 profiles in BUFR format to GTS.

Data issued to GDACs:
We distributed 74,251 profiles in each GDAC; using IFREMER statistics tables we calculated that 47% of NETCDF profiles reached the Global data center in less than 24 hours and 86% of our files in less than 36 hours.

During the reporting period, we also distributed updated corresponding technical and trajectory files for each float, as well as 429 new meta NETCDF files have been issued to both GDACs. Total numbers of NETCDF files issued was about 223,142 files.

We reprocessed 987 floats and created 147,623 profiles to update the technical files to comply with new requirements and technical names approved during last meeting.

Developments at the US DAC:
Migration of the data processing system to a new faster computer, which required adaptations to a newer version of the operating system.

Wrote four new decoders for Iridium floats and one new decoder for Argos floats. These new decoders required some changes to existing decoders, the quality control procedures and the programs generating the NETCDF files. In addition, all decoders for floats with oxygen sensors were improved based on the guidelines developed by the Argo Data Management Team. These improvements resulted in the reprocessing of the profiles from 256 affected floats.

Collection of log files from APEX floats using Iridium as well as the SBD messages from SOLO floats using Iridium. The log files and SBD messages are provided to the US Argo DAC by the float providers. The US Argo DAC is working with the float providers to get these records for older floats. The US Argo DAC also started collecting the data providing the error ellipses for the position for floats using CLS.

Using the global index table for meta data from IFREMER to ensure that US floats have unique WMO identifiers and thus avoid problems with distribution of our profiles to the GDACs.

Generating a figure regularly to monitor the time elapsed to reach GTS for our NETCDF profiles using the BUFR format. The figure will be added to AOML web site.

Web pages:
The URL for the US Argo Data Assembly Center is:
http://www.aoml.noaa.gov/phod/argo/index.php
It provides links to:

- Documentation.
- Operations.
- South Atlantic Regional Data Assembly Center
- FTP Services.
- Related Sites.

Operational products generated from Argo data are available at:
http://www.aoml.noaa.gov/phod/argo/opr/index.php this web site shows profiles, sections, trajectories and pressure records for individual floats processed at the US Argo DAC. This page also shows summary tables of active and inactive floats, statistics related to data distribution via GTS and GDACs, and monthly maps depicting locations of Argo and XBT profiles.

2. Delayed mode QC

Scripps Group:

Scripps Institution of Oceanography (SIO) has evaluated, as part of delayed-mode quality control (DMQC), a total of 110,800 Argo stations (profiles). This is an increase of approximately 16,242 stations (445 float years) since the previous United States Argo National Data Management Report (October, 2011). At present, 99.6% of the DMQC eligible, SIO stations have been completed. Here we define a station as being DMQC eligible if it was sampled more than 12 months ago . The above numbers include all SIO performed delayed-mode stations, including SIO floats, all Argo New Zealand

floats, and 10 Argo-Equivalent floats provided to Argo by Dan Rudnick as part of the Origins of the Kuroshio and Mindanao Current project.

SIO expects to be able to continue to maintain a high DMQC completion percentage during the coming year and will continue to revisit most floats every 6 months.

The DMQC procedures for SOLO/SOLOII floats mentioned in past reports were continued into 2012. Updates to the Argo Climatological Data Set for OW salinity calibration were created quarterly throughout the year.

SIO has continued the transition from the IDG SOLO float utilizing the ARGOS transmission system to the IDG SOLOII / MRV S2A utilizing the Iridium transmission system. By early November, 2012 over 25% or the SIO float array is estimated to be SOLOII/S2A floats. The last ARGOS SOLO was deployed in March 2012. The remaining IDG inventory of SOLO hardware is being reduced by deploying limited numbers of SOLO with similar firmware to that found in the SOLOII and Iridium transmission systems. While the transition to the SOLOII, and the Iridium transmission system, has introduced slightly modified DMQC procedures, the greater vertical sampling resolution in the ascending profile and worldwide 2000dbar pressure range has tended to result in fewer subjective delayed-mode decisions.

The SOLOII/S2A transmits more scientifically important data than older SIO floats. Newer information includes increased cycle timing information, near-surface temperature and salinity, and optional high-resolution profile data (up to 1 Hz). Significant effort has been expended to prepare and submit this additional data so that it can be distributed through the Argo data set. SIO is ready to perform delayed-mode quality control on this data.

University of Washington Group:

As of October 2012, University of Washington had submitted 134,671 delayed-mode files (D-files) to the GDACs via AOML. These are comprised of:

- 122,807 D-files belonging to University of Washington (UW), representing about 90% of UW profiles older than 12 months.
- 11,864 D-files belonging to the KESS project from University of Hawaii (UH), representing 100% of all UH KESS profiles.

Delayed-mode evaluation of conductivity sensor drift was done by using the statistical comparison method of OW (2009), in conjunction with the CTD reference database issued by Coriolis. The latest version was CTD_for_DMQC_2012V01, issued by Coriolis in 2012. Visual comparison with nearby good Argo data was used to complement the statistical method of OW. Results from Stephanie Guinehut's altimetry test were also taken into account as part of the delayed-mode evaluation process.

Delayed-mode adjustment of APEX pressure data were carried out as per the Argo QC Manual. Checking for Truncated Negative Pressure Drift (TNPD) continued because many UW APEX floats that used the old Apf-8 controller were still active.

PMEL group:

As of 22 October 2012, PMEL had a total of 60,082 D-files at the GDAC. Of these, 57,530 were more than one year old – 85% of the total of 67,616 PMEL profiles that were older than one year at that time. At the time that last year's report was written, PMEL had a total of 39,724 D-files at the GDAC. Of these 39,774 were more than one year old – 74% of the total of 53,939 PMEL profiles that were older than one year at that time. We have made significant progress in clearing the backlog of D-files, and hope to continue that progress in the coming year.

The PMEL float DMQC procedure currently consists of the following steps: We perform an automated correction, with visual check, of reported pressure drifts and correction for the effect of these pressure drifts on salinity, as well as an automated correction of conductivity cell thermal lag errors following Johnson et al. (2007). We do visual inspection and modification of quality control flags for adjusted pressure, temperature, and salinity using the SIO GUI. As of this summer, we now overwrite the raw Param_QC flags during this step as required. We use OW Version1.1 with SeHyD_090408 as a historical database for recently deployed floats and adjust run parameters to get appropriate recommended salinity adjustments. We accept or reject the OW recommendations on the basis of comparison with nearly historical and Argo float profiles using the SIO GUI. We are continuing use of WJO Version2.0 instead of OW Version1.1 with most floats that began DMQC using the former system. We still have to modify our routines to accommodate the growing number of PMEL Iridium floats with 2-dbar vertical resolution.

WHOI Group:

As of October 31, 2012, Woods Hole has submitted 88,628 delayed-mode profiles to the GDAC. Of the target group of profiles older than 12 months, approximately 8,000 profiles still require DMQC attention.

3. South Atlantic Argo Regional Center

The South Atlantic Argo Regional Center (SAARC) is coordinating the effort of countries with interest in the Atlantic from 20^{o}N to 40^{o}S.

The web site for the South Atlantic Argo Regional Center (http://www.aoml.noaa.gov/phod/sardac) provides background information, the report from the meeting with interested countries in May 2005, links to products and data servers.

Deployment opportunities provided by countries participating in SAARC can be found here: http://www.aoml.noaa.gov/phod/sardac/logistics/opportunities/index.php

A float donation program has been put in place. This program facilitates the float deployment in remote regions and provides regional data to the volunteers in participating countries (e.g. Argentina, Brazil, Kenya, Gabon).

Float deployments: 55 floats were deployed in the SAARC region by AOML.

Products generated from Argo data are available at:
http://www.aoml.noaa.gov/phod/sardac/products/index.php currently shows four type of products that are derived from hydrographic profiles collected by Argo floats and other instruments:

- Properties of the mixed layer (thickness, temperature and heat storage rate) as monthly fields.
- Maps and cross-sections that depict the annual and semi-annual mean state in the upper ocean.
- Maps of altimetry and geostrophic currents.

Post-DMQC Analysis (data consistency check): Development of the Post-DMQC Analysis is near completion. The October 17 run of 979 floats in the SAARC region is currently being evaluated prior to being released to the community by the end of the year. Once this is done the results will be posted here: http://www.aoml.noaa.gov/phod/sardac/post_dmqc/delay_mode.html and the delayed-mode operators will be informed about significant findings.